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Meridian 1

X11 Release 24.0x

Installation and Maintenance

Book 2 of 2



Meridian 1

X11 Release 24.0x

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BK 2 of 2

Meridian 1

Meridian 1

General maintenance information

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x



About this document

This document describes maintenance features for Meridian 1 system options 21A, 21, 21E, 51, 51C, 61, 61C, 71, 81, and 81C. The chapters in this document describe the following:

- Precautions: guidelines to avoid personal injury and equipment damage
- Communicating with the system: methods for exchanging information with the system
- Routine maintenance: requirements for servicing batteries and air filters
- Hardware maintenance tools: descriptions of circuit card hardware, CPU controls, system alarms, and system monitor indicators
- Software maintenance tools: descriptions of diagnostic programs, the History File, and interactive diagnostics
- User reports: problems typically reported by users
- Customer technical assistance service: information on Northern Telecom Technical Assistance Centers and services

This document does not provide procedures for locating faults, clearing faults, or replacing equipment. See *Meridian 1 fault clearing* (553-3001-510) to locate and clear faults. See *Meridian 1 hardware replacement* (553-3001-520) to replace faulty equipment.

References

See the *Meridian 1 planning and engineering guide* for the following:

- *Library navigator* (553-3001-000)
- *Meridian 1 system overview* (553-3001-100)
- *Meridian 1 equipment identification* (553-3001-154)

See the *Meridian 1 installation and maintenance guide* for the following:

- *Meridian 1 system installation procedures* (553-3001-210)
- *Circuit card installation and testing* (553-3001-211)
- *Telephone and attendant console installation* (553-3001-215)
- *Meridian 1 fault clearing* (553-3001-510)
- *Meridian 1 hardware replacement* (553-3001-520)

See the *X11 software guide* for an overview of software architecture, procedures for software installation and management, and a detailed description of all X11 features and services. This information is contained in two documents:

- *X11 software management* (553-3001-300)
- *X11 features and services* (553-3001-305)

See the *X11 input/output guide* (553-3001-400) for a description of all administration programs and maintenance programs, and the *X11 system messages guide* (553-3001-411) for interpreting system messages.

Precautions

General precautions

Meridian 1 equipment is sensitive to static electricity and environmental conditions. Follow the precautions in this chapter to avoid personal injury or equipment damage.

WARNING

Module covers are not hinged; do not let go of the covers. Lift covers away from the module and set them out of your work area.

WARNING

To avoid the danger of electric shock, be very careful when you work with power equipment and connections. Warning notices are displayed and must be heeded.

There are no user repairable components or assemblies in the power system. If a power unit fails, the complete unit must be replaced. Do not disassemble a power unit under any circumstances because of the risk of electric shock.

Circuit cards

WARNING

Circuit cards may contain a lithium battery. There is a danger of explosion if the battery is incorrectly replaced. Do not replace components on any circuit card; you must replace the entire card.

Dispose of circuit cards according to the manufacturer's instructions.

WARNING

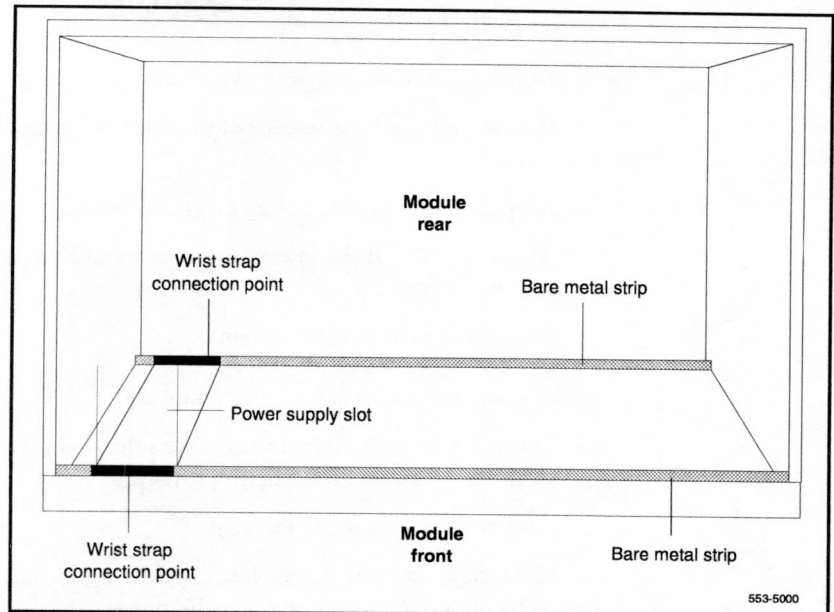
To avoid damage to circuit cards from static discharge, wear a properly connected antistatic wrist strap when you work on Meridian 1 equipment.

If a wrist strap is not available, hold one of the bare metal strips in a module to discharge static. Figure 1 shows the recommended connection points for the wrist strap and the bare metal strips you should touch.

Handle cards as follows:

- Handle cards by the edges only. Do not touch the contacts or components.
- Set cards on a protective antistatic bag. If an antistatic bag is not available, hand-hold the cards, or set them in card cages unseated from the connectors.
- Unpack or handle cards away from electric motors, transformers, or similar machinery.
- Store cards in protective packing. Do not stack cards on top of each other unless they are packaged.
- Store cards in a dry, dust-free area.

Figure 1
Static discharge points



During repair and maintenance procedures, do the following:

- Insert cards into compatible slots only.
- Turn off the circuit breaker or switch for a module power supply before the power supply is removed or inserted.

Note: In AC-powered systems, capacitors in the power supply must discharge. Wait five full minutes between turning off the circuit breaker and removing the power supply from the module.

- Software disable cards, if applicable, before they are removed or inserted.
- Hardware disable cards, whenever there is an enable/disable switch, before they are removed or inserted.
- Return defective or heavily contaminated cards to a repair center; do not try to repair or clean them.

Data disks

Make sure disks are labeled with the software generic and issue number if you remove them from the system.

Follow the precautions below to avoid damaging disks:

- Handle only the hard surface of the disk; never touch the recording surface.
- Keep disks away from strong magnetic fields.
- Avoid exposing disks to extreme heat, rapid changes in temperature, or high humidity.
- Store disks in a suitable container.

Before installing a new disk do the following:

- Check the disk identification to make sure it is the correct disk. Compare software options with the data cartridge.
- Look for any damage to the disk.
- Make sure the arrow on the label is pointing up and the rounded corner on the disk is on the bottom (see Figure 2).

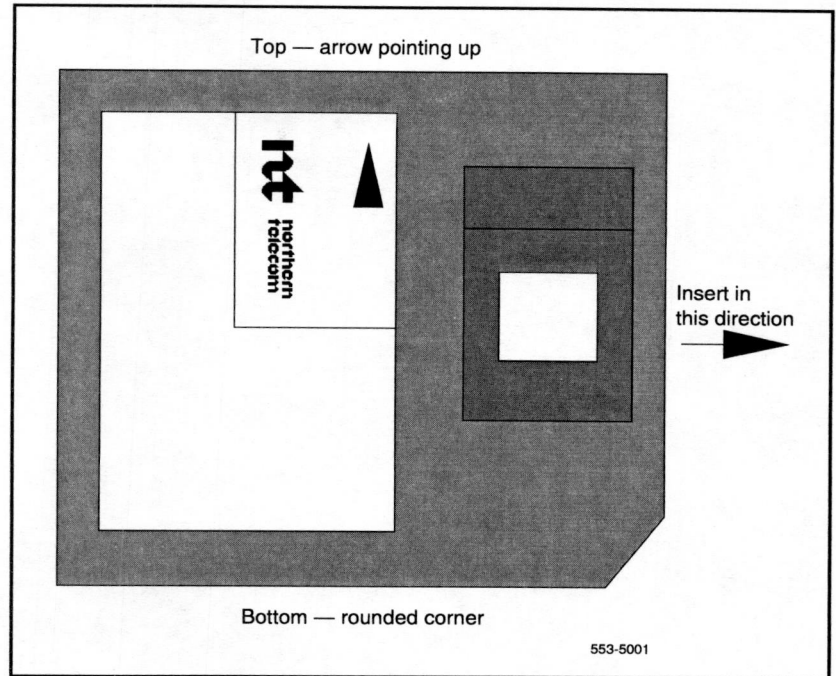
CAUTION

The disk drive can be damaged if an upside-down disk is forced into the slot. If there is significant resistance when you try to insert a disk, remove the disk and check the position.

For more detailed information on data disks, see *X11 software management* (553-3001-300).

Note: No maintenance or cleaning is required on the disk drives.

Figure 2
Disk position



Communicating with the system

You can exchange information with the system through system terminals and maintenance telephones. This chapter discusses these tools for communicating with the system.

Note: Before X11 release 19, only one device at a time can communicate with the system. Accessing a device while another is logged in will log out the device that was already connected. The Multi User Login feature, available with X11 release 19 and later, allows more than one device to interact with the Meridian 1. Refer to *X11 system management applications* (553-3001-301) for details on using this feature.

System terminal

You can send maintenance commands and receive system messages (status and error messages) by accessing the central processing unit (CPU) through an RS-232 device, such as a video display terminal (VDT) or teletypewriter (TTY).

For most system options, only the code is displayed or printed when the CPU sends system messages. For the interpretation of the code and any required action, refer to the *X11 system messages guide* (553-3001-411). Options 51C, 61C, 81, and 81C provide the code, a plain text explanation, and required actions.

Before X11 release 18, if the same data is printed on more than one port, the throughput of each port is equal to the speed of the slowest device. If, for example, a traffic report is printed on two ports, one configured for 9600 baud and the other for 300 baud, the effective throughput of both ports is 300 baud.

X11 release 18 and later provide enhanced I/O buffering (independent throughout). With this capability, devices with higher baud rates run faster than devices that are limited to slower speeds.

Message format

Through the system terminal, you can enter commands that tell the system to perform specific tasks; the system performs the tasks and sends messages back to the system terminal, indicating status or errors. System messages, along with indicators such as maintenance display codes and light emitting diode (LED) indicators, identify faults in the system.

System messages are codes with a mnemonic and number, such as PWR0014. The mnemonic identifies an overlay program or a type of message. The number identifies the specific message. Table 1 gives an example of the format for a system message.

Table 1
System message format

System message: PWR0014	Interpretation
PWR	This message (generated by the system monitor) indicates power and temperature status or failures.
0014	This message means the system monitor failed a self-test.

With options 51C, 61C, 81, and 81C, system messages generated from the Core Common Equipment Diagnostic (LD 135) and the Core Input/Output Diagnostic (LD 137) include the interpretation and any action required. For example, if a CPU test from LD 135 fails, the message displayed is "CCED200 CPU test failed Check the CP card."

See the *X11 input/output guide* (553-3001-400) for a description of all maintenance commands, and the *X11 system messages guide* (553-3001-411) for the interpretation of all system messages.

Local and remote access

A terminal or a modem must remain permanently connected to an SDI port in a network slot to provide a constant I/O interface to the system. Although only one device can communicate with the system at a time, many devices can be installed at local and remote locations.

When a system terminal is installed locally, it is connected directly to a serial data interface (SDI) card, located within a module. When a system terminal is installed at a remote location, modems (or data sets) and a telephone line are required between the terminal and the SDI card.

For a modem connection to the Meridian 1, Bell 103/212 compatible dumb modems are recommended for all systems, except options 51C, 61C, 81, and 81C.

CAUTION

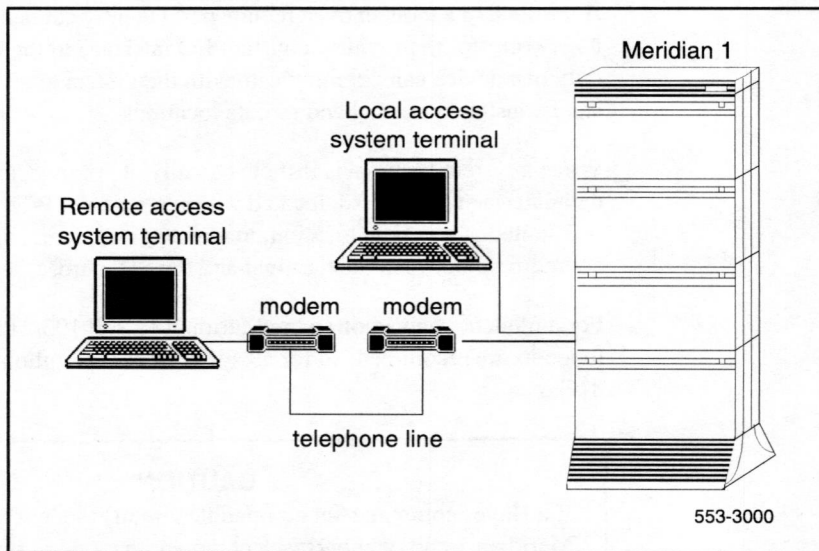
If a Hayes command-set compatible (smart) modem is used at the Meridian 1 end, you *must* select the dumb mode of operation, Command Recognition OFF and Command Echo OFF, before connecting the modem to the SDI port. Refer to the modem instructions to set the mode of operation.

If a printer is connected to an SDI port (locally or remotely), you must disable XON/XOFF flow control so that no characters or signals are sent to the port, to avoid a “ping-pong” effect.

Figure 3 shows typical system terminal configurations. See “Access through the system terminal” in *Meridian 1 fault clearing* (553-3001-510) or *Meridian 1 hardware replacement* (553-3001-520) for the access procedure.

For information specific to option 51C, 61C, 81, and 81C, see “Options 51C, 61C, 81, and 81C terminal and modem guidelines” on page 12.

Figure 3
Local and remote access to a system terminal



Options 51C, 61C, 81, and 81C terminal and modem guidelines

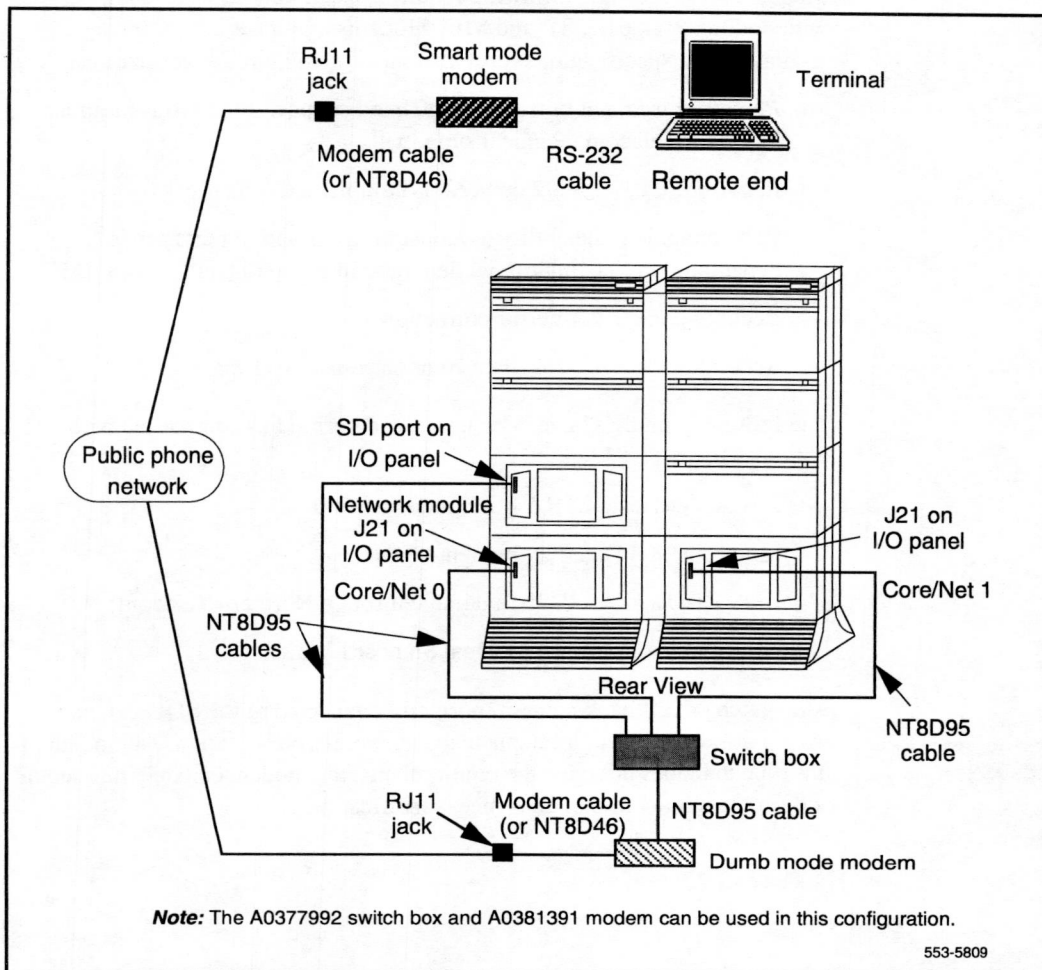
Each NT6D66 Call Processor Card or NT9D19 Call Processor Card provides a data terminal equipment (DTE) port at J21 and a data communication equipment (DCE) port at J25 on the Core and Core/Network Module I/O panel. The designations DTE and DCE refer to the function of the port, not the type of device that connects to the port. Therefore, a modem (which is DCE) connects to the DTE port at J21, and a terminal (which is DTE) connects to the DCE port at J25.

The input/output ports on the CP card (CPSI ports) are used for access to the Core or Core/Network Module, which houses the card. The CPSI ports are active only when the Core associated with the CP card is active. Therefore, the CPSI ports should not be used as the only I/O connection for the system.

Note: For correct operation, terminals used with options 51C, 61C, 81, and 81C must be set to 9600 baud, 7 data, space parity, one stop bit, full duplex, XON.

Figure 4 shows the recommended configuration for remote maintenance monitoring on option 81, which also applies to option 51C, 61C, and 81C. In this configuration, a switch box is normally set to the SDI port to remotely monitor general system operation. The CPSI ports can be accessed for debugging and patch downloading (through your Northern Telecom representative).

Figure 4
Modem to a switch box and SDI and CPSI ports



See “Options 51C, 61C, 81, and 81C terminal and modem connections” in *Meridian 1 system installation procedures* (553-3001-210) for detailed information on configuring and connecting terminals and modems with options 51C, 61C, 81, and 81C.

Note: The A0377992 Black Box ABCDE-Switch, A0381391 UDS FastTalk modem, and cables required for the configuration are available through Northern Telecom.

Modems must meet the following required specifications to be compatible with options 51C, 61C, 81, and 81C. Modems that meet the following recommended specifications must also meet the required specifications.

- **Required:** true, not buffered, 9600 baud support (required for remote Northern Telecom technical support)
- **Required:** CCITT V.32 or V.32bis compliance
- **Recommended:** the ability to adjust to lower and higher speeds, depending on line quality, while maintaining 9600 baud at local DTE
- **Recommended:** V.42 error correction
- **Recommended:** V.42bis data compression

The following models have been tested and verified as compatible with options 51C, 61C, 81, and 81C:

- Hayes V-series ULTRA Smartmodem 9600
- Motorola 28.8 Data/Fax modem
- UDS FastTalk V.32/42b (available through Northern Telecom)
- US Robotics Courier HST Dual Standard V.32bis

A dispatch or call back modem, normally connected to the SDI port, can be used if it meets the requirements listed above. If you want to use a modem of this type that does not meet the requirements, the modem can only be used in addition to a modem that does meet specifications.

Maintenance telephone

A telephone functions as a maintenance telephone when you define the class of service as maintenance set allowed (MTA) in the Multi-line Telephone Administration program (LD 11). A maintenance telephone allows you to send commands to the system through the following maintenance overlays: LD 30, LD 32, LD 33, LD 34, LD 35, LD 36, LD 37, LD 38, LD 41, LD 42, LD 43, LD 45, LD 46, LD 60, LD 61, and LD 62.

Note: The Core Common Equipment Diagnostic (LD 135) and Core I/O Diagnostic (LD 137) are among the overlays that cannot be accessed through a maintenance telephone.

You can test tones and outpulsing through the maintenance telephone. Specific commands for tone testing are given in the Tone and Digit Switch and Digitone Receiver Diagnostic (LD 34).

To enter commands on a maintenance telephone, you press the keys that correspond to the letters and numbers of the command (for example, to enter *LD 42 return*, key in *53#42##*). Table 2 shows the translation from a terminal keyboard to a telephone dial pad.

See "Access through the maintenance telephone" in *Meridian 1 fault clearing* (553-3001-510) or *Meridian 1 hardware replacement* (553-3001-520) for the access procedure.

Table 2
Translation from keyboard to dial pad

Keyboard				Dial pad
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
			Space or #	#
			Return	##
			*	*
Note: There is no equivalent for Q or Z on a dial pad.				

Routine maintenance

You must service batteries and air filters regularly. Follow the guidelines in this chapter to maintain batteries and air filters.

Pedestal air filter

There is an air filter in the pedestal of each column (in all options except 21A). Service the air filters once a month. For instructions on replacing the air filter, see *Meridian 1 hardware replacement* (553-3001-520).

If an air filter is damaged in any way, discard it and install a new one. If a dirty air filter is not damaged, you can clean it with warm water and mild detergent. (Do not use compressed air because it may damage the filter.) When the filter is completely dry, you can reinsert it in the pedestal or store it as a spare.

Option 21E battery pack assembly

An A0378252 Battery Pack Assembly on the NTND02 Misc/SDI/Peripheral Signaling (MSPS) Card is used in option 21E. The battery is constantly recharged through a trickle charging circuit on the NTND01 Integrated CPU/Memory (ICM) Card.

You can run a battery checking routine manually using the command BATT in the Common Equipment Diagnostic (LD 35), or as part of the midnight routines. A battery failure generates system message CED503.

Replace the battery pack every three years, even if no battery failures have occurred. For instructions on replacing the battery pack assembly, see *Meridian 1 hardware replacement* (553-3001-520).

DC-power battery systems

External batteries, often used with DC-powered systems, generally require regular visual inspections. They may also require charger or rectifier tests and pilot cell tests. Perform all inspections and tests according to the supplier's instructions.

To comply with safety requirements, consult the following articles before working with any battery systems:

- Read the “Material Safety Data Sheet” that must be posted to meet Occupational Safety and Health Administration (OSHA) requirements. This article outlines appropriate reserve battery handling procedures.
- Refer to National Electric Code 645-10. This article outlines requirements that call for the installation of AC- and DC-power kill switches to battery systems in certain environments.

Hardware maintenance tools

There are fault indicators and hardware features that help you perform maintenance tasks (particularly identifying and clearing faults). These maintenance tools include the following:

- circuit card features that include card level tests and status indicators
- CPU controls that allow you to control common equipment functions
- system alarms that categorize the severity of a system failure
- system monitor indicators that identify power and temperature faults

Circuit card features

Battery backup for CPU memory

The NTND02 MSPS Card, used in option 21E, is equipped with the A0378252 Battery Pack Assembly. If power to the system is lost, the battery retains CPU memory for up to 60 minutes.

Card test

A card test checks to see that a card is working correctly. Many cards perform a self-test on power-up. You can also force card-level tests through software commands.

Enable/disable switch

Some cards have a switch on the faceplate that enables or disables the hardware for that card.

When you remove a card, whenever possible disable the software; then, disable the hardware by setting the switch to Dis.

Hardware disable a card (set the switch to Dis) before you install it. After the card is locked into position, set the switch to Enb; then enable the software. Software disable and enable cards as described in the *X11 input/output guide* (553-3001-400).

Figure 5 shows the typical location of an enable/disable (Enb/Dis) switch.

LED

Many cards have one or more light emitting diodes (LEDs) on the faceplate. The LED gives a visual indication of the status of the card or of a unit on a card.

When a *green* LED is steadily lit, it indicates the card is operating normally. When a green LED is off, it indicates the card is disabled or faulty.

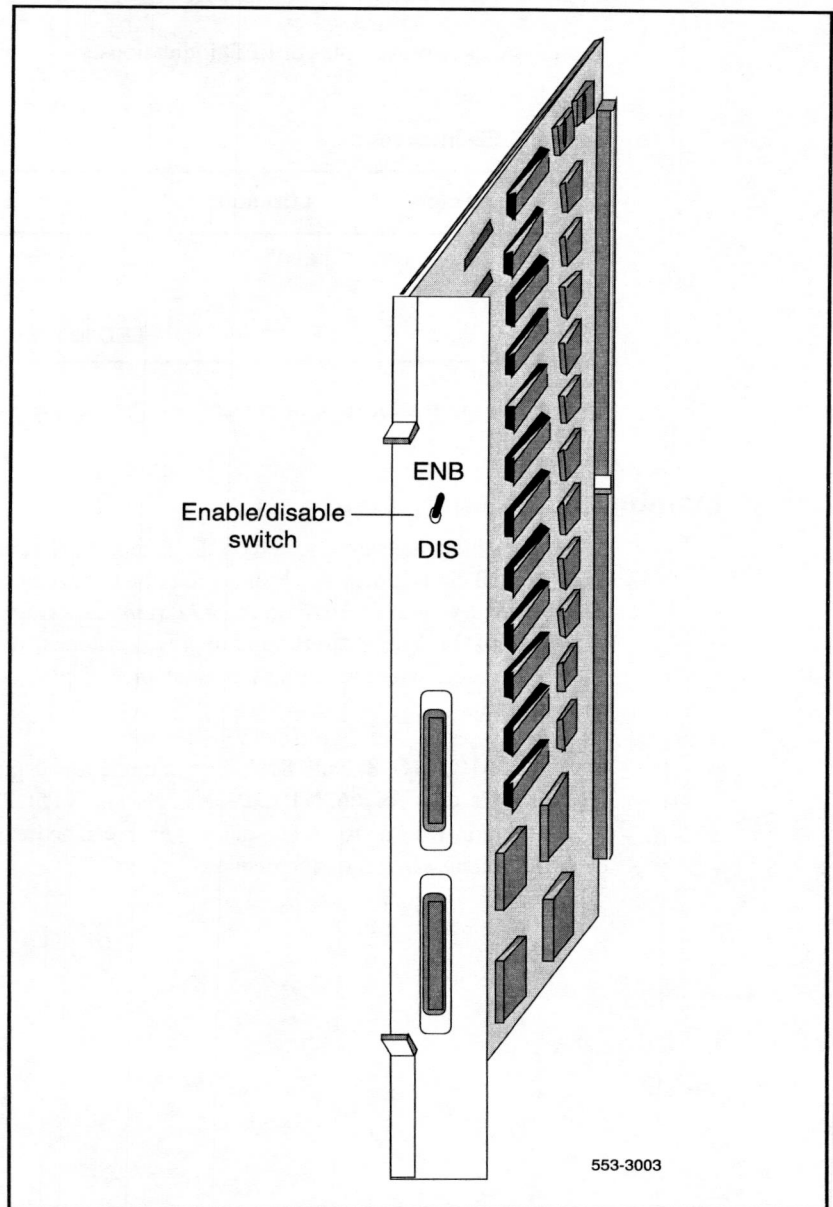
When a *red* LED is steadily lit, it indicates the card, or a unit on it, is disabled or faulty. When a red LED is off and power is available to the card, it indicates the card is operating normally.

Note 1: The shape of the LED (some are round and some are rectangular) does not indicate a different function.

Note 2: In options 61C, 81, and 81C, the red LEDs on the NT6D65 Core to Network Interface (CNI) Cards are lit when the associated Core is inactive. This is normal operation.

When intelligent peripheral cards are installed, the red LED on the faceplate remains lit for two to five seconds while a self-test runs. (The time required for the self-test depends on the type of card.) If the test is successful, the LED flashes three times and remains lit until the card's software is configured and enabled, and then the LED goes out. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), the card should be replaced.

Figure 5
Sample enable/disable switch



In options 51C, 61C, 81, and 81C, when Core common control cards are installed, a self-test runs. If the self-test is successful, the LED flashes three times, then goes out.

Table 3 gives two examples of LED indications.

Table 3
Sample LED indications

Type of card	LED color	Status
Common equipment power supply	green	LED lit = operation normal
Digital line card	red	LED lit = disabled

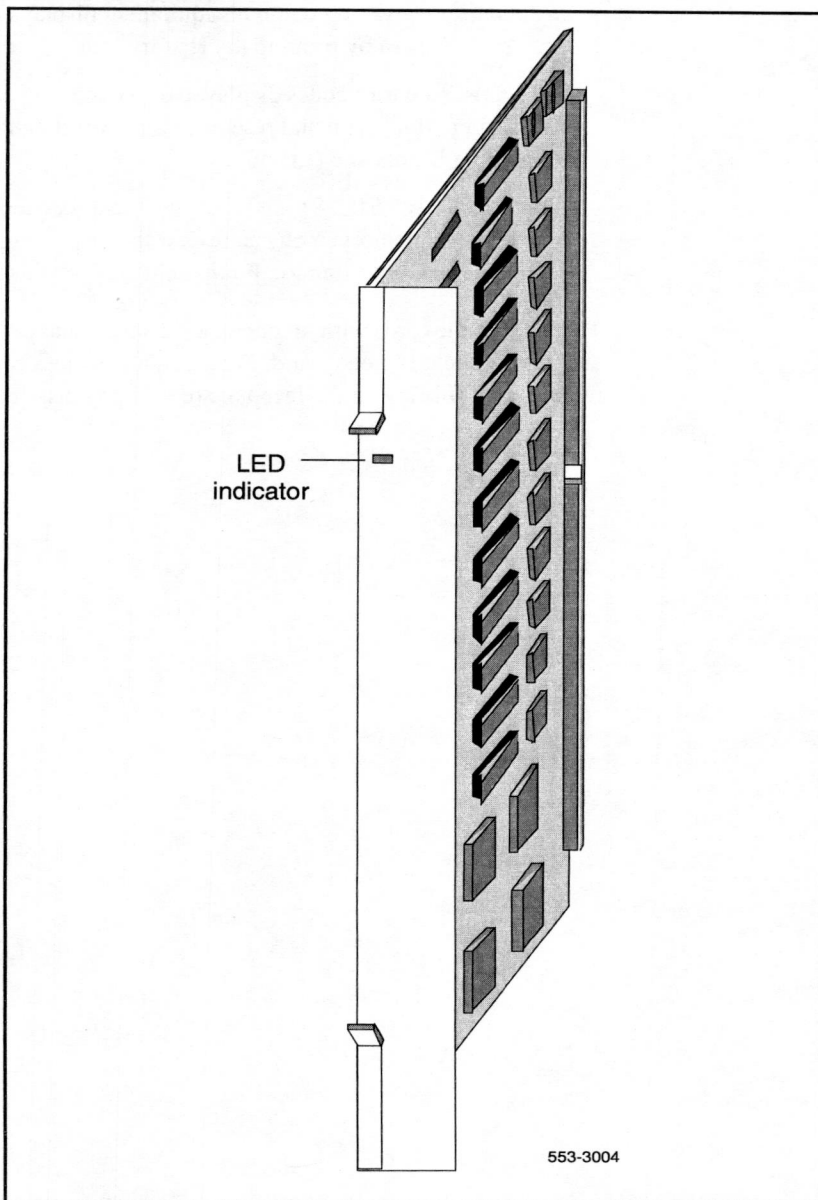
Figure 6 shows the location of the LED on the faceplate of an intelligent peripheral line card.

Maintenance display code

Maintenance displays are located on the faceplate of some circuit cards. A hexadecimal code is displayed. Interpretations of the maintenance display codes are listed under "HEX" in the *X11 system messages guide* (553-3001-411). You should examine previous codes, system messages, and visual indicators with any current maintenance display codes to properly analyze faults.

In options 51C, 61C, 81, and 81C, the maintenance display on the Call Processor Card (NT6D66, NT9D19, NT5D10 or NT5D03) shows two lines of information with up to 16 characters per line. The hexadecimal code and its definition are shown on the display.

Figure 6
Sample LED indicator



Each new code shown on a maintenance display overwrites the one before it. However, note the following:

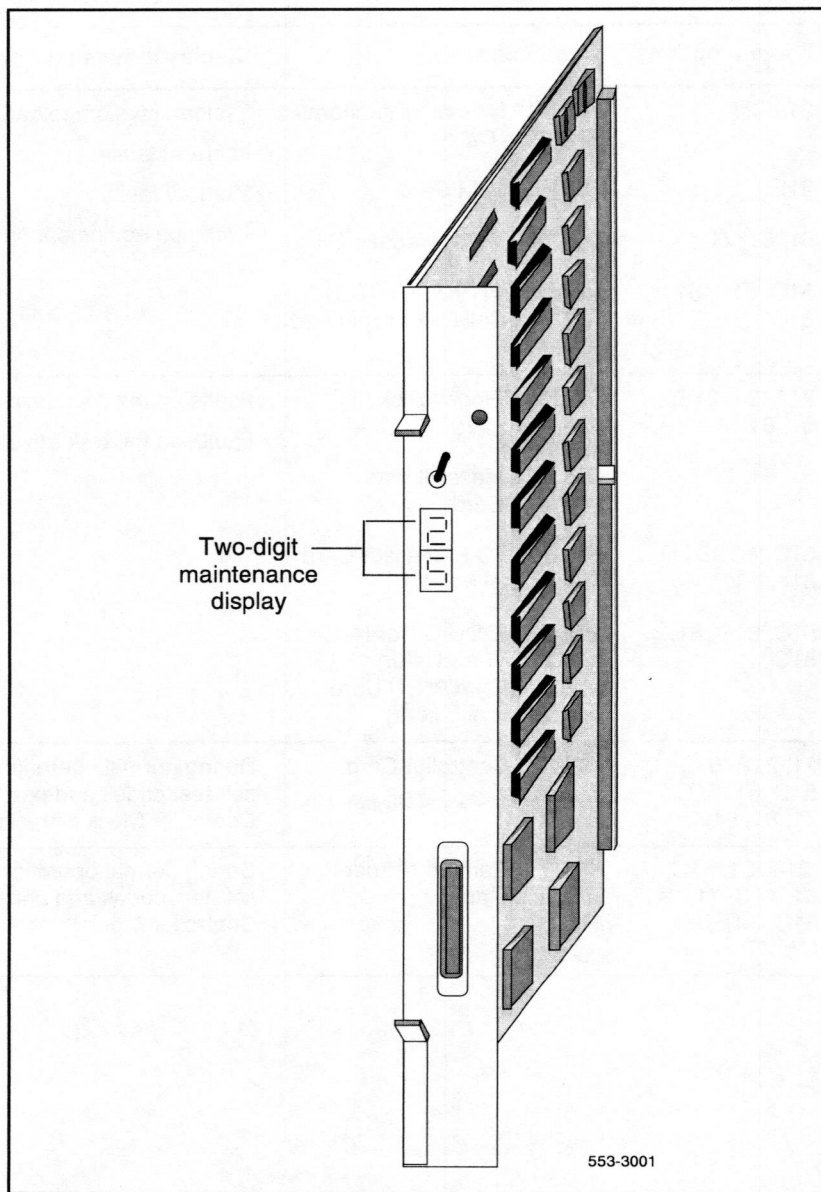
- All codes received on common equipment displays are recorded. You can review them by printing the History File.
- The most recent 16 codes displayed on a controller card stay in memory. You can review them and reset the counter through the Network and Signaling Diagnostic (LD 30).
- In options 51C, 61C, 81, and 81C, the most recent 64 displays on a CP card stay in memory. You can review the displays on the active CP card through the Core Common Equipment Diagnostic (LD 135).

Table 4 lists the cards with maintenance displays and the type of information the codes indicate on each card. Figure 7 shows the location of the maintenance display on the faceplate of a floppy disk interface card.

Table 4
Circuit cards with maintenance displays

System options	Circuit card	Display indication (for all related cards)
21A, 21	NT8D19 Memory/Peripheral Signaling Card	Sysload (system reload) status
21E	NTND01 ICM Card	Interrupt faults
51, 61, 71	QPC580 CPU Interface Card	Memory faults
51C, 61C, 81, 81C	QPC580 CPU Interface Card	Common equipment hardware faults
51C, 61C, 81, 81C	NT6D66, NT9D19, NT5D10, NT5D03 Call Processor Card	
21A, 21, 21E, 51, 61	QPC742 Floppy Disk Interface Card	Faults on the disk drive unit
51, 61, 71	QPC584 Mass Storage Interface Card	Faults on the disk drive interface card
61C (NT9D11), 81	NT6D63 I/O Processor Card (release 19 and 20)	
51C, 61C, 81, 81C	NT5D61 IODU/C Card (release 23 and later) NT5D20 IOP/CMDU Card (release 21 and later)	
21, 21E, 51, 51C, 61, 61C, 71, 81, 81C	NT8D01 Controller Card NT1P62 Fibre Controller	During normal operation, display shows self-test codes and port number on which Controller Clock is tracking
21E, 51, 51C, 61, 61C, 71, 81, 81C, STE, RT, NT, XT	NT7R52 Remote Carrier Interface Card	During normal operation, display shows self-test codes and port number on which Controller Clock is tracking

Figure 7
Sample maintenance display



CPU controls

Switches and buttons on common equipment cards allow you to control CPU activity and clear common equipment faults.

Initialize button

Pressing the manual initialize (Man Int) button associated with the active CPU starts the Initialize Program. The Initialize Program clears common equipment faults and then rebuilds call-dependent data and generates system messages indicating the status of the system. This process is called an *initialization*. Call processing is briefly interrupted during an initialization.

Manual initialize buttons are located on the following cards:

- In options 21A and 21, the initialize button is on the NT8D19 Memory/Peripheral Signaling Card.
- In option 21E, the initialize button is on the NTND01 ICM Card.
- In options 51, 61, and 71, the initialize button is on the QPC580 CPU Interface Card.
- In options 51C, 61C, 81, and 81C, the initialize button is on the NT6D66, NT9D19, NT5D10, or NT5D03 Call Processor Card.

Normal/maintenance switch

There is a normal/maintenance (Norm/Maint) switch on the QPC580 CPU Interface Card and the Call Processor Card. In dual CPU systems (options 61, 61C, 71, 81, and 81C), you use this switch as follows to keep the dual CPUs from switching, or trying to switch, when you are testing or replacing common equipment hardware on the inactive CPU:

- On the CPU you are not testing or replacing, set the switch to Maint. This CPU will be *active*.
- On the CPU you are testing or replacing, set the switch to Norm. This CPU will remain *inactive* as long as the other CPU is set to Maint.

For regular operation in dual CPU systems, set both normal/maintenance switches to Norm. For option 51 and 51C (a single CPU system), set the switch to Maint.

Figure 8 shows the location of both the manual initialize button and the normal/maintenance switch on the QPC580 CPU Interface Card.

Reload button

Reload (Rld or Man Rst) buttons allow you to manually activate the System Loader program. The System Loader initiates call processing and starts memory-checking diagnostics. This process is called a *sysload* or *system reload*. Here are the locations of the reload button for the various options:

- In options 21A and 21, the reload button is on the QPC687 CPU Card.
- In option 21E, the reload button is on the NTND01 ICM Card.
- In option 51, the reload button is on the NTND10 Changeover and Memory Arbitrator (CMA) Card (or QPC581 before X11 release 18).
- In options 61 and 71, the reload button is on the NTND10 (or QPC581) CMA Card. To start a sysload, you must simultaneously press the reload button on both CMA cards.
- In options 51C, 61C, 81, and 81C, the reload button (Man Rst) is on the Call Processor Card. To start a sysload, you must simultaneously press the reload buttons on both CP cards.

Figure 8
Manual initialize button and normal/maintenance switch
on the CPU interface card

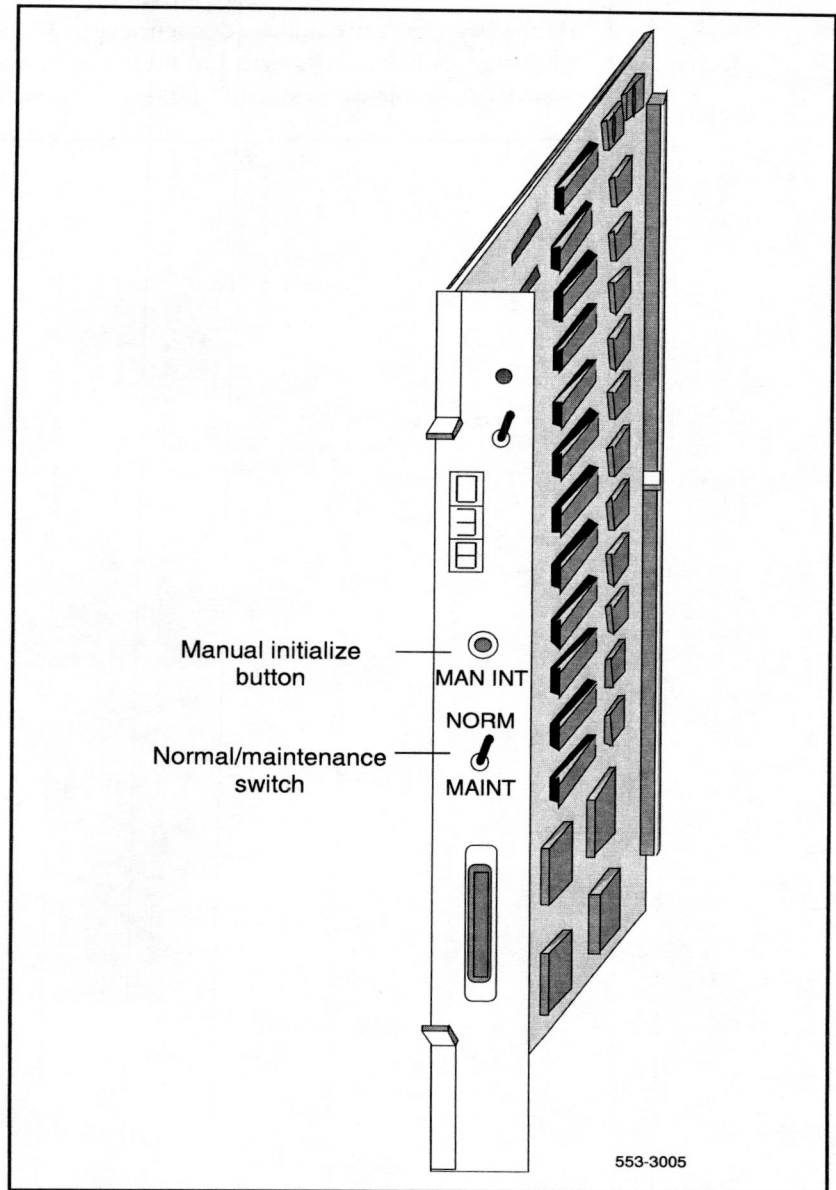
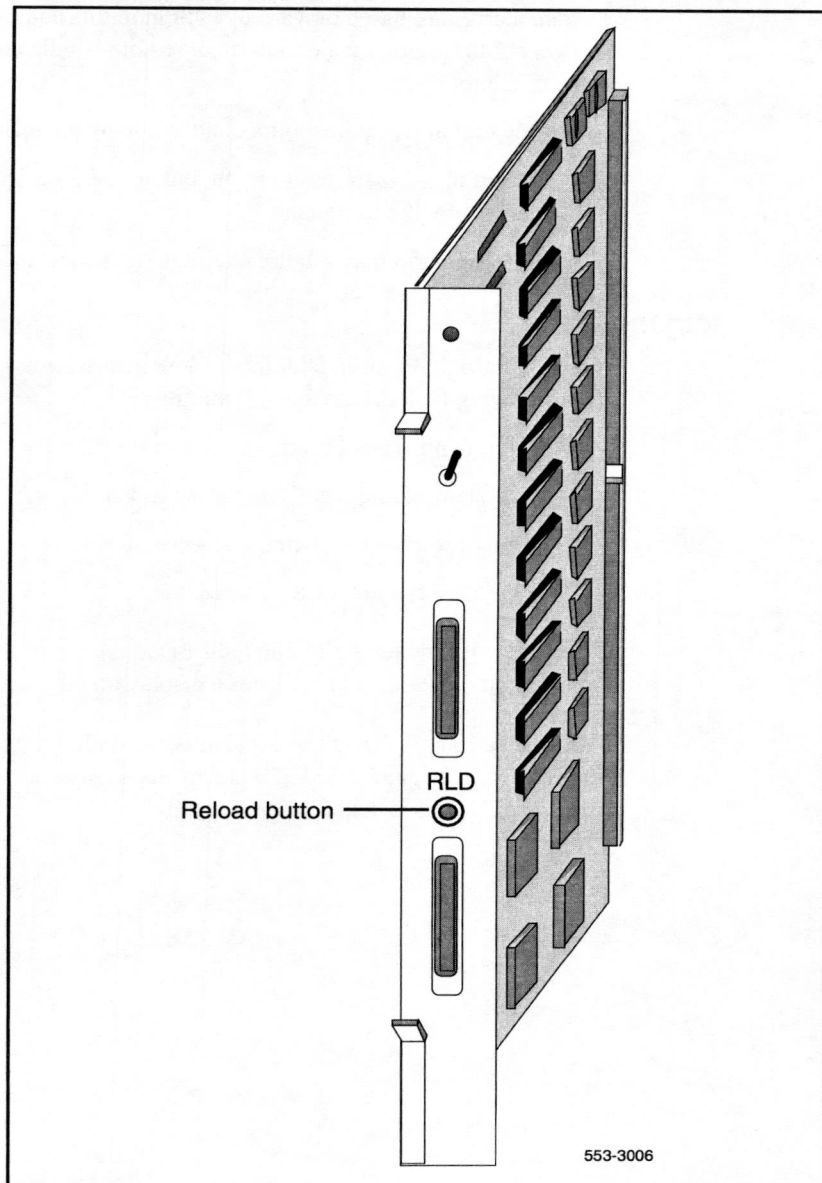


Figure 9 shows the location of the reload button on a QPC581 CMA Card.

CAUTION

During a sysload active calls are disconnected and the system goes into an emergency line transfer state. Use the reload button only if you are specifically instructed to do so in Northern Telecom Publications.

Figure 9
Reload button on the changeover and memory arbitrator card



System alarms

System alarms are based on various fault monitors and indicators. The category of the alarm—major, minor, or remote—indicates the severity of the system failure:

- A major alarm requires immediate action by the technician.
- A minor alarm requires attention, but not necessarily immediate attention, by the technician.
- A remote alarm may require attention by the technician.

Major alarms

A major alarm indicates a fault that seriously interferes with call processing. The following faults cause a major alarm:

- CPU or control bus failure
- disk system failure when attempting to load the system
- system power failure (without reserve power)
- temperature fault (excessive heat)

When there is a major alarm, the red LED at the top of the affected column lights. A major alarm also activates a display on all attendant consoles.

When a Meridian 1 is equipped with a power failure transfer unit, a major alarm causes designated 500/2500 telephones to connect directly to Central Office trunks; this is called a line transfer.

Minor alarms

A minor alarm indicates the system hardware or software has detected a fault requiring attention. The following faults cause a minor alarm: Automatic identification of outward dial (AIOD) trunk failure

- conference failure
- digitone receiver failure
- memory failure
- more than one fault on different line and trunk cards in one shelf (indicated on affected customer's console only)
- network failure (indicated on affected customer's console only)
- peripheral signaling failure
- serial data interface failure
- tone and digit switch failure

A minor alarm displays an alarm on attendant consoles in customer groups affected by the fault. (A minor alarm indication on the console is an optional feature, enabled and disabled on a customer basis through data administration procedures.)

Remote alarms

A remote alarm is an optional extension of a major alarm to another location, such as a monitoring or test center, or to an indicator, such as a light or bell. When a major alarm occurs, the Meridian 1 provides relay contact closure across two remote alarm lines, REMALMA and REMALMB. These lines are extended to the main distribution frame (MDF) through the system monitor to MDF cable for customer use. The relay contacts are rated at 30 V dc and 2 amps. The REMALMB line is the return or ground for the REMALMA line. Northern Telecom does not extend remote alarm lines beyond the MDF.

System monitor indicators

The system monitor checks the column temperature, cooling system status, and system voltage status and controls line transfer states accordingly.

NT7D15 System Monitor

System option 21A is equipped with the NT7D15 System Monitor, which is a paddle board installed on the rear of the backplane. This system monitor performs the following:

- If the main circuit breaker in the system trips (for example, if there is a power surge or short circuit), the system monitor starts a line transfer and sends a remote alarm signal.
- If the temperature of the column reaches 70 degrees C (158 degrees F), the system monitor trips the main circuit breaker, starts a line transfer, and sends a remote alarm signal.
- If the power supply loses +5 volts, the system monitor starts a line transfer and sends a remote alarm signal.
- If the power supply loses any voltage other than +5 volts, the system monitor lights the column LED, sends a major alarm indication to the CPU, and sends a remote alarm signal.
- If call processing stops, the system monitor lights the column LED and starts a line transfer.

Note: The NT7D15 System Monitor does not generate system messages.

When major system failures occur, the system monitor sends a remote alarm signal. As an option, an indicator, such as a bell or light, can be connected to the system monitor to receive the remote alarm signal.

NT8D22 System Monitor

System options 21, 21E, 51, 51C, 61, 61C, 71, 81, and 81C are equipped with the NT8D22 System Monitor, which is installed in the rear of the pedestal in each column. Table 5 lists faults monitored by this system monitor.

Note: The NT8D15 System Monitor must be used in option 21A. In multiple-column systems, there is one master system monitor, located in the column with CPU 0, and multiple slave system monitors. A switch setting on each system monitor defines the master or the address of each slave.

Table 5
Faults monitored by the NT8D22 System Monitor

Power faults	Source
CPU condition	CPU failure Sysload (system reload)
Main power loss	System input power, AC or DC
Power supply failure	Common equipment power supply Common/peripheral equipment power supply Peripheral equipment power supply Ringing generator
Temperature alarm	Blower unit Column temperature sensors

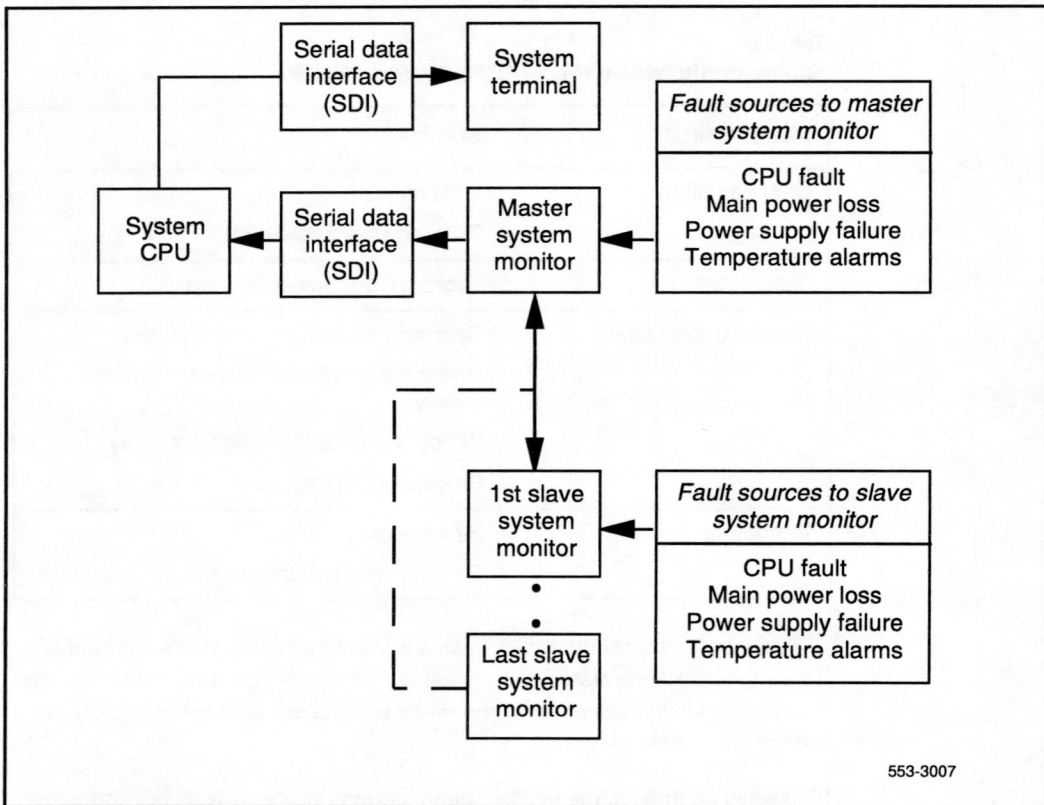
The master system monitor checks the CPU column and periodically polls the slaves to check their status. When polled, the slaves report their status to the master. If a slave does not respond when it is polled, the master reports the address as a faulty slave.

If a slave is removed, the master cannot communicate with higher addresses. Therefore, the master considers the removed slave and all slaves with a higher address as disabled. For example, if slave 2 is disabled, the master also reports slaves 3, 4, and up as disabled.

The system monitor reports power equipment status and faults to the CPU. (Only the master system monitor communicates with the CPU.) System messages generated by the system monitor are identified by the mnemonic PWR. Figure 10 shows the flow of messages from NT8D22 System Monitors to the system terminal.

If there is a fault, the system monitor lights the LED on the affected column.

Figure 10
NT8D22 System Monitor message flow



Line transfer

As an option, you can connect one or more power failure transfer units (PFTUs) to the Meridian 1. Each PFTU connects up to eight designated 500/2500 telephones to Central Office trunks. If call processing stops, those 500/2500 telephones are transferred through the PFTU to the Central Office so that you still have outside connections. A line transfer occurs during the following situations:

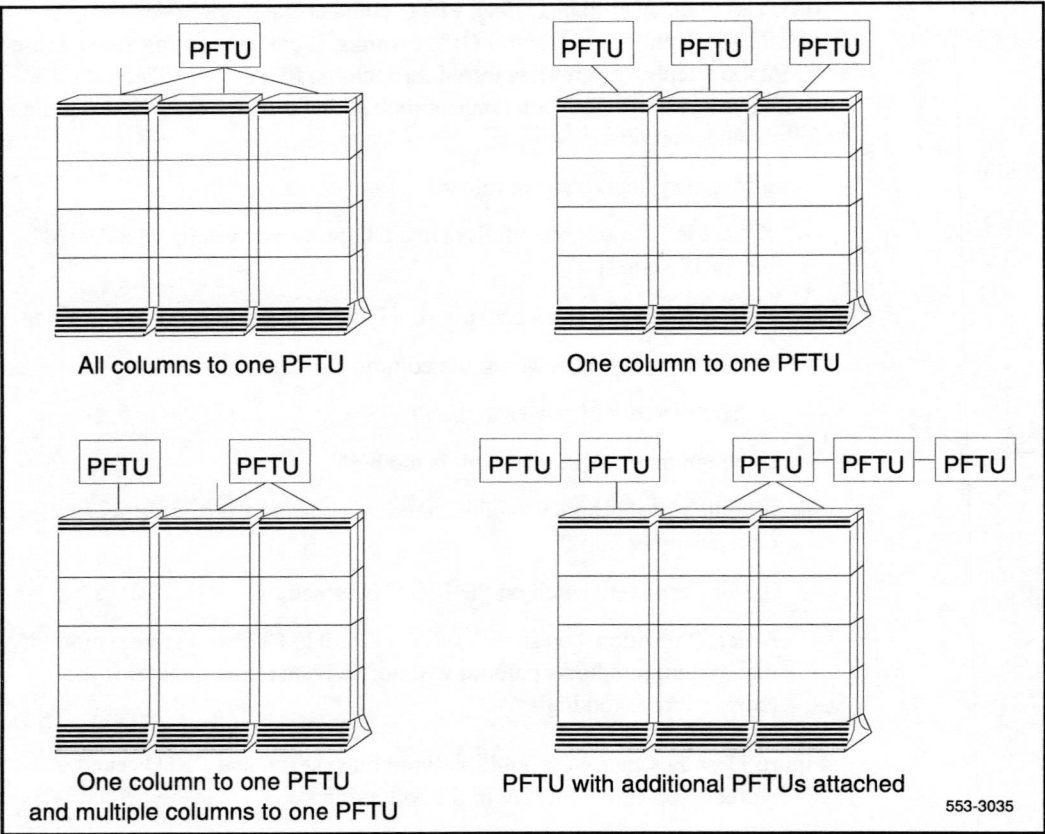
- during a sysload (system reload)
- if there is a major power failure in a DC-powered system (as detected by the TRIP signal)
- if call processing stops because of a CPU failure
- if there is a loss of power to the column
- if there is a loss of power to the PFTU
- if the temperature in a column is too high
- if a line transfer button on the attendant console is pressed (this applies on a customer basis)
- if a line transfer switch on the PFTU is turned on

Note: If position 4 on switch 1 (SW1) is set to OFF on a system monitor, that system monitor's column will not activate a line transfer if the temperature is too high.

Figure 11 shows four ways multiple-column systems and PFTUs can be configured. You can configure in the following ways:

- connect all the columns in a system to a single PFTU
- connect each column to an individual PFTU
- combine connecting individual columns to individual PFTUs and multiple columns to a single PFTU
- attach additional PFTUs to a PFTU that is connected to one or multiple columns

Figure 11
PFTU configurations



Main power loss

The system monitor receives status and control signals from the external power system. The system monitor then generates system messages that indicate the status of main and reserve power supplies.

You can connect a reserve (back-up) power supply to the Meridian 1: either an uninterruptible power supply (UPS) for AC-powered systems or reserve batteries for DC-powered systems. If the main source of external power is lost, power to the system is maintained by the UPS or reserve batteries.

If the main power supply is lost, the system monitor generates a major alarm. The NT8D22 System Monitor also generates system messages to indicate the system is running on reserve power.

Module power supply failure

There are four types of module power supplies:

- common equipment (CE) power supply
- common/peripheral equipment (CE/PE) power supply
- peripheral equipment (PE) power supply
- ringing generator

The NT8D22 System Monitor handles complete or partial failures in a module power supply as follows:

- If the output voltage is higher than the threshold for +5 volts, the affected power supply shuts down, the column LED lights, and a system message is sent.
- If the output voltage is higher than the threshold for other than +5 volts, power for only that voltage shuts down in the affected power supply, the column LED lights, and a system message is sent.
- If the output voltage is lower than the threshold for any voltage, power for only that voltage shuts down in the affected power supply, the column LED lights, and a system message is sent.
- If the input voltage is lower than the threshold, the affected power supply shuts down and then recovers when the input level recovers.

To help you pinpoint a power supply problem, the master NT8D22 System Monitor identifies the following:

- the column with the fault (system monitor 0–63)
- the module (0–3) in that column
- the power supply unit (1–2) in the module

Figure 12 shows the power equipment designations in a column.

Temperature alarms

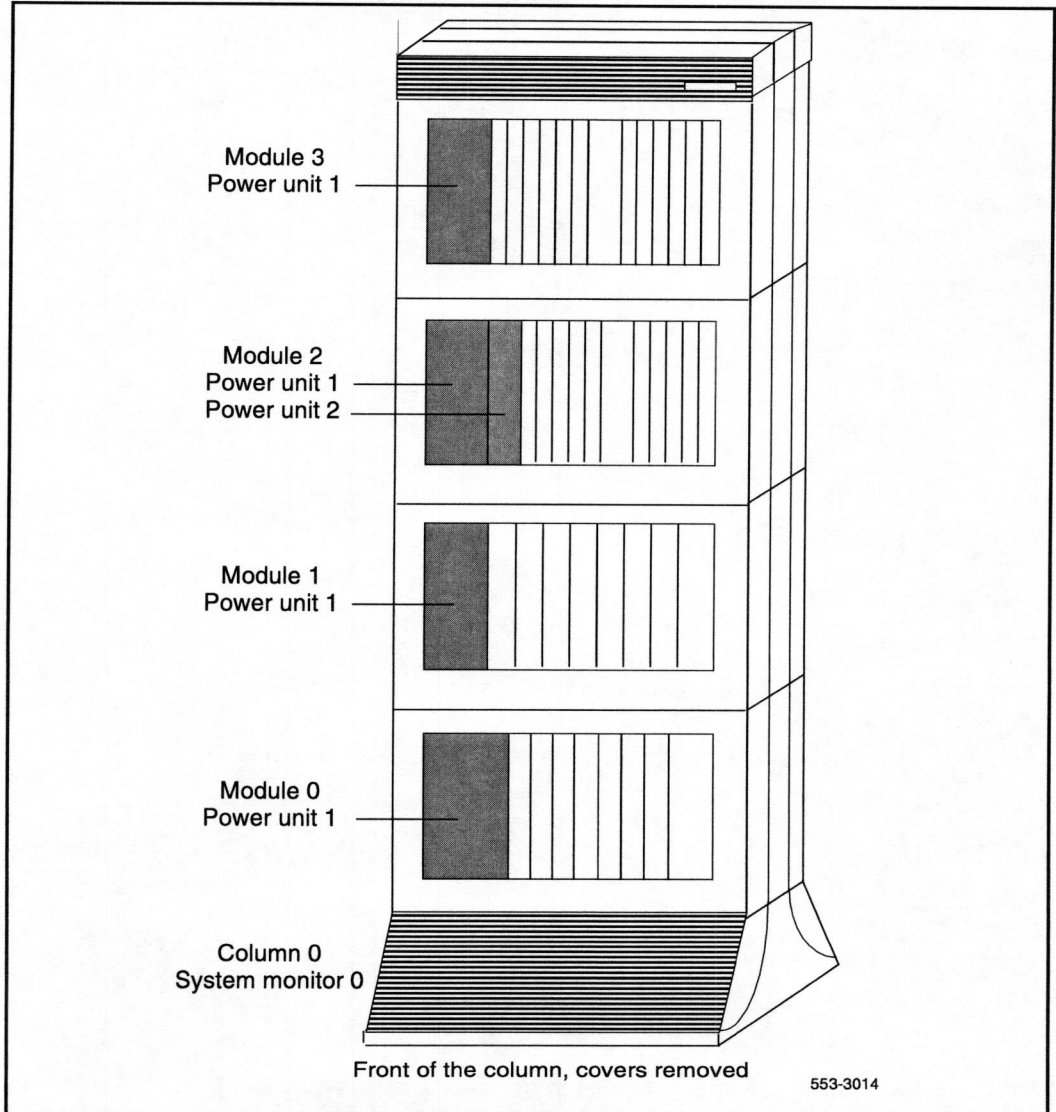
System option 21A has two fans in the top cap. If the temperature of the system exceeds 70 degrees C (158 degrees F), the NT7D15 System Monitor trips the main circuit breaker to prevent further overheating.

Each column in options 21, 21E, 51, 51C, 61, 61C, 71, 81, and 81C is cooled by a blower unit (NT8D52AB with AC power or NT8D52DD with DC power) in the pedestal. All of these systems are equipped with the NT8D22 System Monitor, which performs the following functions:

- If there is a partial or complete failure in a blower unit, the system monitor lights the column LED and generates a system message.
- If the thermostats in a column report a temperature exceeding 70 degrees C (158 degrees F), the system monitor lights the column LED, generates a system message, then, providing this condition exists for 30 seconds, shuts down power to the column in 30 seconds.

The NT8D22 System Monitor generates a system message if the air leaving the column exceeds 55 degrees C (131 degrees F). This thermal alarm may indicate a loss of air-conditioning in the room, loss of ventilation in the column, a problem with the blower unit, or a blocked air filter.

Figure 12
Power equipment designations from the master NT8D22 System Monitor



Software maintenance tools

Diagnostic programs

Note: See “Options 51C, 61C, 81, and 81C features” on page 49 for information specific to option 61C, 81 and 81C.

Diagnostic software programs monitor system operations, detect faults, and clear faults. Some programs run continuously; some are scheduled.

Diagnostic programs are *resident* or *non-resident*. Resident programs, such as the Error Monitor and Resident Trunk Diagnostic, are always present in system memory. Non-resident programs, such as the Input/Output Diagnostic and Common Equipment Diagnostic, are used as Midnight and Background Routines or for interactive diagnostics. Non-resident programs are loaded from the system disk and are run as scheduled or upon request.

Non-resident programs are called overlay programs or loads. They are identified by a title and a number preceded by the mnemonic for load (for example, Trunk Diagnostic—LD 36).

See the *X11 input/output guide* (553-3001-400) for detailed information on all diagnostic programs.

Error Monitor

The Error Monitor is a resident program that continuously tracks call processing. The Error Monitor generates system messages if it detects invalid or incorrectly formatted call-processing information.

System messages generated by the Error Monitor are preceded by the mnemonic ERR, which usually indicates hardware faults, or the mnemonic BUG, which usually indicates software problems. With prompt ERRM in the Configuration Record (LD 17), you can instruct the system to print or not print ERR or BUG messages.

Refer to the *X11 system messages guide* (553-3001-411) for help in interpreting system messages, including ERR and BUG.

Initialize Program

The Initialize Program momentarily interrupts call processing as it clears common equipment faults. It then rebuilds call-dependent data and generates system messages, with the mnemonic INI, that indicate the status of the system. This process is called an *initialization*.

Through an initialization, you can download firmware from the CPU to superloop network cards and controller cards. Call processing is interrupted for an additional amount of time during this process.

You can activate an initialization by pressing the manual initialize (Man Int) button on the following:

- NT8D19 Memory/Peripheral Signaling Card in options 21A and 21
- NTND01 ICM Card in option 21E
- QPC580 CPU Interface Card in options 51, 61, and 71
- NT6D66, NT9D19, NT5D10, or NT5D03 Call Processor Card in options 51C, 61C, 81, and 81C

An initialization always occurs automatically after the System Loader program runs. An initialization often occurs when a software or firmware fault is detected and when a common equipment hardware fault is detected.

Midnight and Background Routines

In the Configuration Record (LD 17), you can select the overlay programs that will run in the *Midnight Routine* and *Background Routine*. These routines automatically perform maintenance checks. Programs included in the Midnight Routine are defined with the prompt DROL (derived from “daily routine overlay”). Programs included in the Background Routine are defined with the prompt BKGD.

Note: A memory test must be run once a day on options 21 and 21E. Therefore, the Common Equipment Diagnostic (LD 35) runs as part of the Midnight Routine even if it is not programmed.

The Midnight Routine runs once every 24 hours. This routine is preset to run at midnight when a system is shipped, but you may assign a different time in the Configuration Record. When it is time for the Midnight Routine to start, the system cancels any other program.

The Background Routine runs when no other program is loaded in the overlay area. The programs included in the Background Routine run in sequence repeatedly until the Midnight Routine runs or there is another request to use the overlay area (for example, if you log on to check the status of a circuit card).

You may include the programs listed in Table 6 in Midnight and Background Routines. Your maintenance requirements and the configuration of your system determine the programs you include in Midnight and Background Routines.

Note: Software Audit (LD 44) should always be used in the Background Routine.

Table 6
Programs used in Midnight and Background Routines

Program number	Program function
LD 30	Network and Signaling Diagnostic
LD 32 (Midnight only)	Network and Peripheral Equipment Replacement
LD 33	1.5 Mbyte Remote Peripheral Equipment Diagnostic
LD 34	Tone and Digit Switch and Digitone Receiver
LD 35 (see Note 1)	Common Equipment Diagnostic
LD 36	Trunk Diagnostic 1
LD 37 (see Note 1)	Input/Output Diagnostic
LD 38	Conference Circuit Diagnostic
LD 40	Call Detail Recording Diagnostic
LD 41	Trunk Diagnostic 2
LD 43 (Midnight only)	Data Dump (see Note 2)
LD 44	Software Audit
LD 45	Background Signal and Switching Diagnostic
LD 46	Multifrequency Sender Diagnostic for ANI
LD 60 (Midnight only)	Digital Trunk Interface Diagnostic
LD 61 (Midnight only)	Message Waiting Lamps Reset
Note 1: For option 51C, 61C, 81, and option 81C, use LD 135 instead of LD 35. Use LD 137 and LD 37.	
Note 2: LD 43 will automatically be activated during midnight routines if changes have been made within the past 24 hours.	

Overlay Loader

This resident program locates, loads, and checks all overlay programs. It automatically activates the Midnight and Background Routines. You can load programs manually by entering commands through the system terminal or maintenance telephone. Once the program is loaded, you see the program mnemonic (such as TRK for Trunk Diagnostic) on the system terminal.

You can also use the Overlay Loader to enable, disable, and display the status of the disk drive unit.

Overload Monitor

The system continuously monitors the volume of system messages. If it detects too many error messages from a line or trunk card, the system activates the Overload Monitor program. The Overload Monitor disables the faulty card and generates system messages with the mnemonic OVD.

Refer to the *X11 system messages guide* (553-3001-411) for help in interpreting system messages.

Resident Trunk Diagnostic

This program automatically monitors all trunk calls and records apparent faults on each trunk. If the number of faults on a trunk exceeds the threshold for that trunk, the program generates a system message identifying the trunk and the type of fault.

A failure on a trunk may keep the trunk from detecting incoming calls. The threshold mechanism cannot detect such a failure, so this program also records how many days it has been since each trunk received an incoming call. If you suspect some incoming calls are not being processed, you can use the command LMAX in Trunk Diagnostic 1 (LD 36) to identify the trunk with the maximum idle days.

System Loader

The System Loader program loads all call-processing programs and data and starts memory-checking diagnostics. After all required programs and data have been loaded and all checks performed, the System Loader is erased from system memory, the Initialize Program runs, and normal call processing begins. This process is called a *sysload* or *system reload*.

The System Loader operates automatically on system power up or if a common equipment or power fault destroys information in the system memory. For maintenance purposes, you generally activate this program only if call processing has stopped.

You can start a sysload manually by pressing the reload (Rld) button on the following:

- QPC687 CPU Card in options 21A and 21
- NTND01 ICM Card in option 21E
- NTND10 (or QPC581) CMA Card in options 51, 61, and 71 (simultaneously press both buttons in options 61 and 71)
- NT6D66, NT9D19, NT5D10, or NT5D03 Call Processor Card in options 51C, 61C, 81, and 81C (simultaneously press both buttons)

Note: The system loses the time and date during a sysload (except on option 61C, 81, and 81C). You should reset the time and date using LD02.

CAUTION

During a sysload *active* calls are not disconnected and the system goes into an emergency line transfer state. Activate the System Loader only if you are specifically instructed to do so in Northern Telecom Publications.

To minimize sysload time, you can enable the Short Memory Test capability in LD 17 (prompt SMEM). If you enable the test, only one pass of memory testing is performed on a normal reload. If any subsequent system failure causes an automatic reload, the full six-pass Memory Test is performed on all system memory.

Note: A sysload completes so quickly on options 51C, 61C, 81, and option 81C that the Short Memory Test is not useful. Therefore, the package was not designed to be compatible with options 51C, 61C, 81, and 81C.

Options 51C, 61C, 81, and 81C features

When options 51C, 61C, 81, and 81C receive a system reload signal, the sysload occurs in two to five minutes, depending on the size of the customer database. During the sysload, options 51C, 61C, 81, and option 81C perform a core shelf test, which includes self-tests on the CP and the IOP part of the IOP/CMDU. The results of the self-tests are displayed on the liquid crystal display (LCD) on the CP card, the hex display on the IODU/C card, and the system terminal. On the other core cards, the LED blinks three times after a successful test.

Options 51C, 61C, 81, and 81C typically perform an initialization in under 90 seconds. You can manually initialize only the active core side.

In options 51C, 61C, 81, and 81C, the overlays reside in dynamic random access memory (DRAM) after they are loaded from the hard disk during an initial software load (software is shipped on redundant hard disks). Since they are always in resident memory, the overlays can be loaded quickly.

Options 51C, 61C, 81, and 81C can diagnose faults in field replaceable units for all core hardware, including cables. In case of a failure, a message in a natural language (such as English) appears on the system terminal and on the liquid crystal display (LCD) on the CP card.

If there is a hardware fault, the system attempts a recovery. In the case of a redundant hardware failure, under certain conditions options 51C, 61C, and option 81 will attempt a graceful switchover to the core side without the failure.

Options 51C, 61C, 81, and 81C remote operation capabilities include remote access to both Core Modules or Core/Network Modules; the ability to sysload, initialize, or put the system in a split mode; and the ability to upload and download the customer database. You can access the core complex in each Core Module or Core/Network Module through the I/O ports on the CP cards.

The History File feature

If you have a printer connected to the system, each system message is printed as it is received. If you do not have a printer connected, you can use the History File to store a limited number of system messages in protected memory. The contents of the file may then be printed on demand using Print Routine 3 (LD 22).

The messages stored are specified on a system basis and can be one or more of the following types:

- customer service changes (CSC)
- maintenance messages (MTC)
- service changes (SCH)
- software errors (BUG)
- initialization and sysload messages (INI and SYS)
- traffic messages (TRF)

For information on selecting the messages to be stored, see *X11 features and services* (553-3001-305). For help with interpreting system messages, refer to the *X11 system messages guide* (553-3001-411).

The contents of the History File are erased during a sysload or if you change the History File's length. However, because the History File is located in protected data store, the contents survive an initialization.

You can change the length of the History File with the prompt HIST in the Configuration Record (LD 17). The maximum length of the file depends on the amount of protected data store available, which in turn depends on the number of system features that require protected data store.

If the History File is full, the first messages stored are replaced by incoming messages. If this happens, the system gives a "file overflow" message at the start of a printout so you know some information has been replaced by newer messages.

Interactive diagnostics

You can load overlay programs, including programs called *maintenance routines*, into memory through the system terminal or maintenance telephone. This function is performed by the Overload Loader program.

Note: The programs used in Midnight and Background Routines are also used manually as interactive diagnostic programs (see Table 6).

Maintenance routines are used interactively with a command/response format. In this format, you enter a command that tells the system to perform a specific task. The system performs the task and sends system messages indicating the status or errors back to you.

With interactive diagnostics you can do the following:

- disable, test, and enable specific equipment
- verify that a reported fault still needs to be cleared
- verify that a repair procedure has cleared a fault

All maintenance programs and commands are described in detail in the *X11 input/output guide* (553-3001-400). For help with interpreting system messages, refer to the *X11 system messages guide* (553-3001-411).

The Enhanced Maintenance feature

System software sometimes requires modifications, called *patches*, provided by Northern Telecom Technical Assistance Centers. The command ISS in Print Routine 3 (LD 22) prints the software generic and issue. A plus sign (+) by the issue number means a patch is in service.

The Enhanced Maintenance feature does the following:

- allows patches to automatically survive a sysload
- permits patches on non-resident programs
- records all patches in the system
- allows data disks to be shipped with pre-loaded patches

If there is a problem with a patch, the CPU sends system messages with the mnemonic EHM to the system terminal or the History File.

Manual continuity tests

You can perform manual continuity tests on superloop network cards, intelligent peripheral equipment, and Basic Rate Interface (BRI) equipment. A continuity test generates a signaling pattern at one point, monitors its progress, and checks for its detection at an end point. For example, when a superloop network card sends a signal to a controller card, the continuity test verifies the following:

- the superloop network card sent the signal
- the loop carried the signal to the controller card
- the controller card received the signal

In a point-to-point continuity test, a superloop network card or a controller card can generate or detect the test pattern. In loopback tests, one card, a superloop network card, a controller card, or a multi-purpose ISDN signaling processor (MISP) card, is both the generator and the detector. Only idle timeslots are tested in any of the continuity tests.

There are two types of loopback tests for BRI equipment. In one type of test, the pattern generated by the MISP card loops back through the digital subscriber loop (DSL) interface. In the other type of test, the pattern generated by the MISP card loops back through an S/T-interface line card (SILC) or a U-interface line card (UILC), depending on which is specified. Both types of test are accessed as Test 9, but responses to the series of prompts for Test 9 determine the loopback point.

Fifteen continuity tests can run simultaneously. When a test is completed, it stops, the status is reported, and the other tests continue running. You can check the status of any test at any time. When all the tests end, the number of tests run and any failed tests are reported to the CPU. You can display the results at any time during the procedure.

There are nine continuity test configurations. You can run each test by entering a set of prompts outlined in the Background Signaling and Switching Diagnostic (LD 45). Figure 13 shows point-to-point configurations. Figure 14 shows loopback configurations.

Figure 13
Manual continuity tests: point-to-point configurations

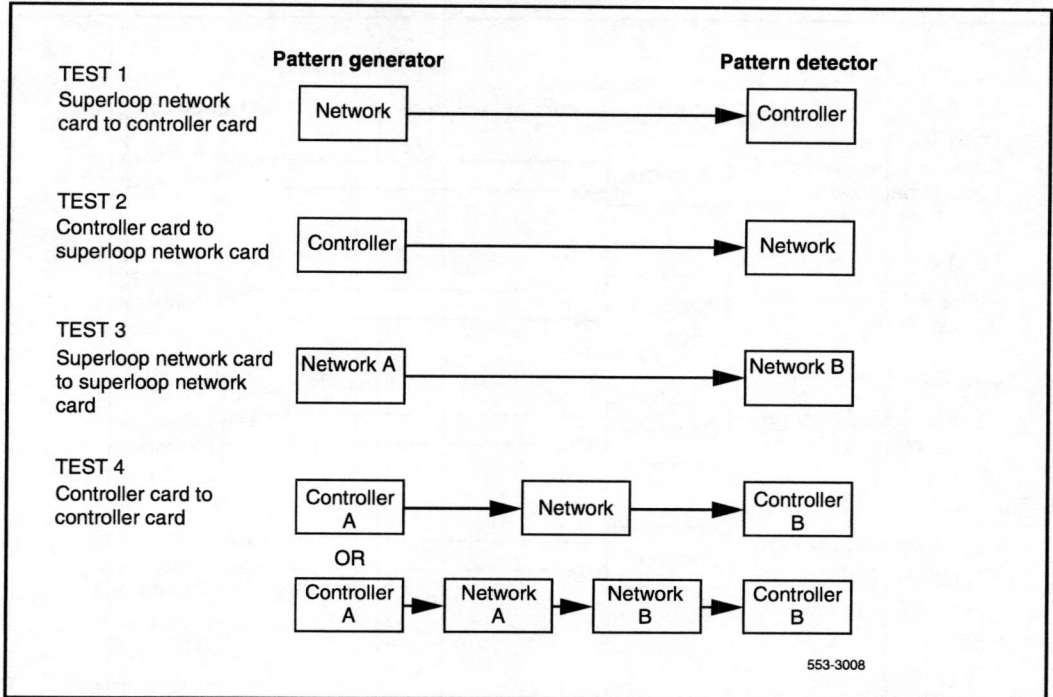
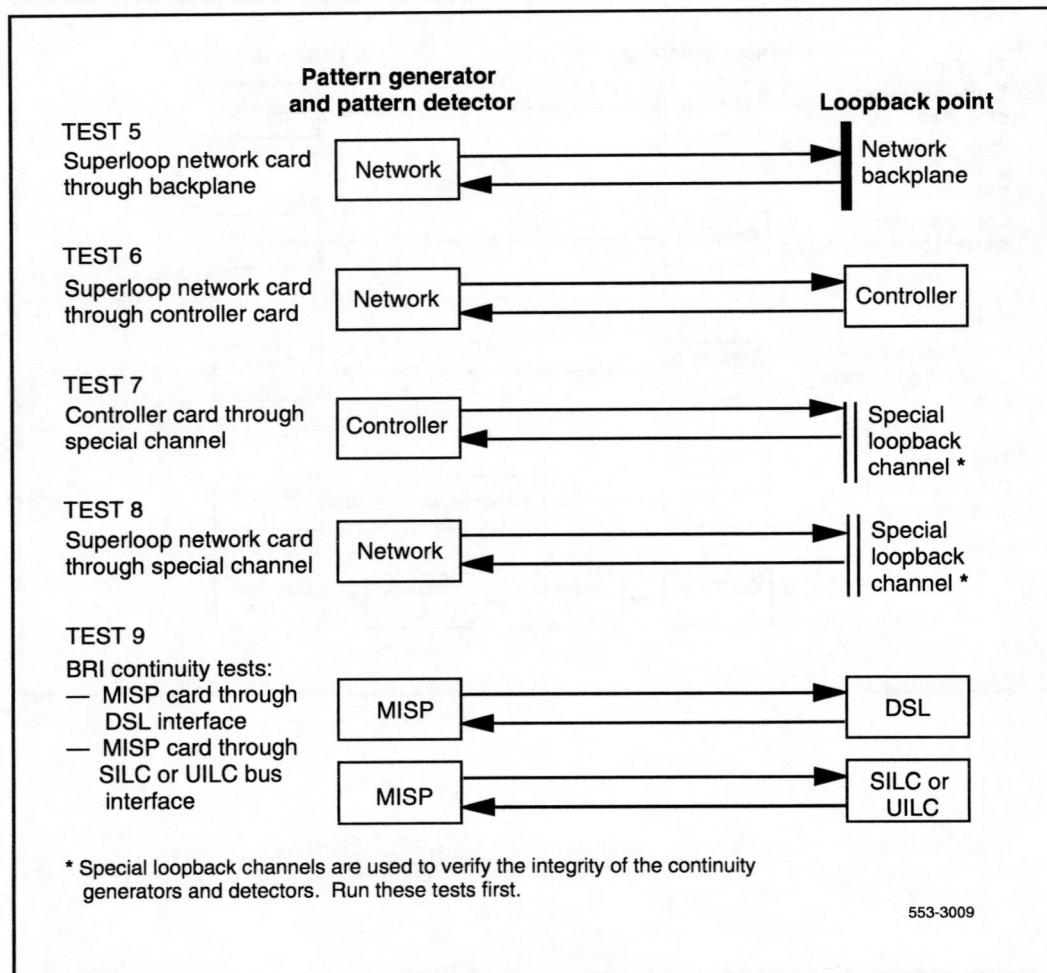


Figure 14
Manual continuity tests: loopback configurations



User reports

Reports from system users often tell you about problems that the system may not indicate. Many faults reported by users, such as a damaged telephone or data set, are obvious and can be fixed by replacing the damaged equipment.

Some faults are less obvious and may be caused by other equipment, such as a defective peripheral equipment line or trunk card. To classify the fault in these cases, check for system messages and visual fault indications. You may also need to have the user reproduce the problem so you can determine the sequence of events that led to the fault.

Table 7 lists problems users typically report.

Table 7
User report indications

User report	Type of fault
Major alarm reported by attendant No ring on 500/2500 telephones	Power
Major alarm reported by attendant	Common equipment
Minor alarm reported by attendant Users cannot transfer or conference Users cannot dial out on 500/2500 telephones	Network equipment
Trouble with calls on attendant console Trouble with calls on 500/2500 telephones Trouble with calls on SL-1, M1000, or digital telephones	Peripheral equipment
Users have trouble with a specific trunk Callers report continuous ringing Trouble with calls on console or telephones, or both	Trunk
Trouble with calls Trouble with equipment (such as handset, headset, or display)	Attendant console
Trouble with calls Trouble with equipment (such as handset or add-on module)	Telephone

Technical assistance service

CTS's mission is to resolve Nortel Product defects. CTS will provide technical assistance for systems experiencing problems, even if it has been determined that the problem is not a product defect. However, CTS will charge the distributor for the support of non-defect related problems as described in this document. CTS requires an open Purchase Order number on file. Otherwise, the purchase number is required at the time of call generation.

Note: Based on warranty billing programs within the North America regions, an invoice may or may not be generated.)

The availability of assistance, both product defect and non-product defect, is prioritized based upon specific priority classifications. These classifications are known as Emergency, Service Affecting, and Non-Service Affecting, and are defined as follows:

- diagnosing and resolving software problems not covered by support documentation
- diagnosing and resolving hardware problems not covered by support documentation
- assisting in diagnosing and resolving problems caused by local conditions

Technical assistants receive three types of service requests:

- Emergency requests receive an immediate response; see Table 8. Service for emergency requests is continuous until normal system operation is restored.
- Descriptions of Service-Affecting requests are listed in Table 9. Equipment for which these requests are intended are operable but are missing critical functionality.

- Non-Service Affecting requests, also shown in Table 9, list customer-manageable problems or problems that could be resolved at the distributor level.

Except as excluded by the provisions of warranty or other agreements with Northern Telecom, a fee for technical assistance may be charged, at rates established by Northern Telecom. Information on rates and conditions for services are available through Northern Telecom representatives.

Collect the information listed in Table 10 before you call for service

Table 8
Emergency requests to CTS

Emergency - System is down or, essentially, is operable. Restoration of basic functionality to pre-incident condition is a top priority. Support is offered 24 hour, 7 days a week. response is within 30 minutes and resolution continues until emergency condition is cleared. applies to full commissioned, functioning switches and any of the following:

- System ceased call processing
- System degradation such that 10% or 100 or more voice or data lines are not processing calls
- Loss of auxiliary processor (Meridian MAX, Meridian MAIL, Meridian CCR, Meridian LINK, Symposium CCS)
- Stand-by CPU out of service
- Two or more system-initiated sysloads per day
- Two or more system initiated initializations per day
- Tape or disk drive failure
- Potential system degradation or outage
- Loss of critical trunk group
- Slow dial tone (8 seconds or more)
- Customer declares critical functionality - see Raised Priority in this section
-

Table 9**Service affecting and non-service affecting systems**

Service Affecting: system is operational, but critical functionality is being impacted.

Customer's key business elements are functioning, but severe impact to the operation is occurring. This classification reflects the customer's needs and is set by the COAMS or distributor's authorized caller at the time the CSR is opened.

Non Service Affecting: Problems experienced have no, or isolated affect on majority of users.

Customer's key business elements are functioning without impact. Some isolated service impact is noticed by some system end users. This classification also reflects the customer's needs and is set by the COAMS or distributor's authorized caller at the time the CSR is opened.

- CTS will provide assistance for emergency problems 24 hours a day, 7 days a week.
- CTS will provide assistance for service-affecting and non-service affecting problems only during regular business hours.

Table 10**Checklist for service requests**

Name of person requesting service	_____
Company represented	_____
Telephone number	_____
System option number/identification	_____
System serial number	_____
Installed software generic and issue (located on data disk)	_____
Modem telephone number and password (if applicable)	_____
Request classification (see Tables 8 and 9)	_____
Description of assistance required	_____

For non-product defect problems, such as a customer manageable problem or a problem that could be resolved at the distributor level, CTS may charge for the service provided. Charges for these Services may be found in the Nortel Product Catalog/Price Manual under Technical Support.

CTS will make every attempt to work with the distributor to understand the impact of a service problem to the End Customer's business. When contacting CTS, distributors are requested to verify the priority classification at the time the customer service report is opened. This will assist CTS in prioritizing calls within the Service Affecting and Non-Service Affecting categories.

Raised priority

Nortel recognizes that non-emergency service requests may be of high impact and be critical to a customer's business. The authorized caller should identify the critical business impact or time sensitive nature of an incident directly to the engineer at the time the customer service request is opened or anytime thereafter to raise the priority. Specific agreements or expectations pertaining to this incident should be reached at this time. Under these circumstances, the problem may be raised to an Emergency priority and treated as such. For these customer critical situations, the following will apply:

- Emergencies by definition will take precedence.
- Service Affecting and Non-Service Affecting problems will need the appropriate distributor management approval to proceed with the problem resolution.
- Outside of normal business hours a valid purchase order number will be required prior to proceeding with the problem resolution.
- Refer to the Nortel Product Catalog/Price Manual for CTS charges.

When prioritizing Customer Impact priorities, CTS will always give the highest priority to emergency-based businesses such as hospitals, fire departments, police departments, and rescue squads.

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Meridian 1

Meridian 1

General maintenance information

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Information is subject to change without notice. Nortel Networks Corporation reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules, and the radio interference regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

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CLEARING
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Meridian 1

Meridian 1

Fault clearing

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About this document

This document gives instructions for locating and clearing faults. The procedures in this document are based on the assumption that the Meridian 1 is properly installed (for example, all card locations, option switch settings, and cable connections are correct) and was fully operational before the fault.

To use this document, you should have a basic knowledge of Meridian 1 operation and maintenance. (Contact Northern Telecom Training Centers for information on courses.) You should also read and fully understand *Meridian 1 general maintenance information* (553-3001-500) before attempting to clear faults.

This document does not provide procedures for replacing equipment. See *Meridian 1 hardware replacement* (553-3001-520) to replace faulty equipment.

References

See the *Meridian 1 planning and engineering guide* for:

- *Meridian 1 system overview* (553-3001-100)
- *Spares planning* (553-3001-153)
- *Meridian 1 equipment identification* (553-3001-154)

See the *Meridian 1 installation and maintenance guide* for:

- *Meridian 1 system installation procedures* (553-3001-210)
- *Circuit card installation and testing* (553-3001-211)
- *Telephone and attendant console installation* (553-3001-215)
- *Meridian 1 general maintenance information* (553-3001-500)
- *Meridian 1 hardware replacement* (553-3001-520)

See the *X11 input/output guide* for a description of all administration programs and maintenance programs, and to the *X11 system messages guide* for interpretation of system messages.

How to clear faults

Fault clearing process

When a fault must be cleared in the Meridian 1, follow these steps:

- Observe and record all fault indicators.

System messages, visual fault indicators, maintenance display codes, and user reports identify many problems. If the indicators are not current or seem incomplete, you may need to print the History File for previous messages, you may need to initialize the system for information on the current status, or you may need to do both.

- Look up all maintenance display codes and system messages in the *X11 system messages guide*.

The interpretation of the message or code may identify faulty equipment and tell you what action to take to clear the problem. If you cannot clear the fault through information in either of these guides, follow the process in this document to isolate and clear the fault (see “Using this document” on page 4).

- Try to test and enable disabled equipment.

You may be able to hardware reenabling circuit cards by unseating them, then reinstalling them. You may be able to software reenabling cards by disabling them, then reenabling them. When the cause of a fault is not clearly evident, a software test may help you identify the problem.

- Replace equipment as necessary.

When you identify faulty equipment, follow procedures in *Meridian 1 hardware replacement* (553-3001-520). When you think the fault is corrected, follow the instructions in “Final maintenance procedure” on page 177 to completely restore normal operation.

Using this document

To use the information in this document, follow the steps below:

- 1 Classify the fault by the indicators present (see “Fault indicators” on page 6). When multiple faults are indicated, clear them in the following order:
 - Power faults
 - Common equipment faults
 - Network equipment faults
 - Peripheral equipment faults
 - Trunk faults
 - Attendant console faults
 - Telephone faults
- Note:** Always clear possible power faults then common equipment faults before any other type of fault.
- 2 Go to the chapter for clearing the type of fault identified. There is a chapter for each type of fault listed above (for example, “Clearing power faults” on page 19). As closely as possible, match the problem to a symptom listed at the beginning of the chapter.
- 3 Go through the procedure for clearing each possible cause of the problem until the fault is cleared.
- 4 When the fault is corrected, follow the instructions in “Final maintenance procedure” on page 177 to completely restore normal operation.

Procedure 1 is an example of the process described above.

Procedure 1**An example of how to use this document**

- 1 Classify the fault—The fault indicators are listed in Table 1. They identify a common equipment fault.

Table 1**Using fault indicators to classify a fault**

Fault indicators	Type of fault
SYSTEM MESSAGE: CED013	Common equipment
VISUAL FAULT INDICATOR: Red LED lit on memory card	Common equipment
MAINTENANCE DISPLAY CODE: Code indicating a fault displayed on CPU interface card	Common equipment
USER REPORT: Major alarm reported by attendant	Common equipment

- 2 Go to the chapter for clearing the fault and match the symptom—Go to “Clearing common equipment faults” on page 45 and you will find “Fault indicated on memory card” in the table of contents.
- 3 Go through the procedures—Check for a defective memory card. If it is not defective, check for another defective common equipment card. If you find the CPU interface card is defective, you can disregard the remaining possible causes.
- 4 Go to “Final maintenance procedure” on page 177—Follow the instructions in each step.

Fault indicators

When there is a fault in the system, you may be notified by any combination of the following indicators:

- system messages
- visual fault indicators
- maintenance display codes
- user reports

Each type of indicator is described below.

System messages

System messages are codes with a mnemonic and number, such as PWR0014. The mnemonic identifies a software program or a type of message. The number identifies the specific message. Use system messages with other indicators, such as maintenance display codes and visual indicators, to identify and clear faults.

Table 2 lists the most common fault indicating messages and the type of fault they indicate. For a complete list and interpretation of system messages, see the *X11 system messages guide*.

Table 2
System message fault indicators and related fault types (Part 1 of 2)

System messages	Type of fault
BSD090 PWR messages	Power
BSD080, 085, 086, 103 CED messages CIOD, CMON, and CNI messages INI001, 002, 004, 005 IOD006, 007, 060, 061, 291–297 NWS030, 102, 103, 142 SYS messages	Common equipment

Table 2
System message fault indicators and related fault types (Part 2 of 2)

System messages	Type of fault
BSD081, 101, 110, 111, 121, 130, 201–203, 205–209, 600, 602 CNF messages DTA, DTC, DTI messages ERR020, 120, 4060 INI003, 007–012 NWS101, 141, 201–204, 301, 401 OVD021, 022, 023, 031 TDS messages XMI messages	Network equipment
BSD301, 401, 402 ERR4062 NWS301, 401, 501 OVD001–010, 024 XMI messages	Peripheral equipment
ERR090, 220, 270 OVD003, 008, 009, 010 TRK messages	Trunk
BSD501	Attendant console
BSD501 ERR500 MWL500 NWS501 OVD001–002, 004, 005 XMI messages	Telephone

Visual fault indicators

There are visual indicators on the Meridian 1 that can help you identify faults. These indicators include:

- a major or minor alarm display on the attendant console: indicates a possible power, common equipment, or network equipment fault
- circuit card light emitting diodes (LEDs): indicate that a card or a unit on a card is disabled
- column LED: indicates a fault in the column

Table 3 lists visual indicators you may see and the types of faults they indicate.

Table 3
Visual fault indicators and related fault types

Indicator	Type of fault
Major alarm on attendant consoles Red LED lit on column top cap Green LED off on module power supply Circuit breaker tripped (down) Remote alarm	Power
Major alarm on attendant consoles Red LED lit on CE card (other than the CPU interface card on the non-active CPU)	Common equipment
Minor alarm on an attendant console Red LEDs lit or flashing on associated cards	Network equipment
Red LED lit on associated card	Peripheral equipment
Red LED lit on trunk card	Trunk
Red LED lit on associated cards	Attendant console
Red LED lit on associated cards	Telephone

Maintenance display codes

Maintenance displays are located on the faceplate of some Meridian 1 circuit cards. A maintenance display shows an alphanumeric code that can indicate the status of the system and aid in fault identification. Interpretations of the maintenance display codes are listed under "HEX" in the *X11 system messages guide*.

Each new code shown on a maintenance display overwrites the one before it. However, all codes received on common equipment displays are recorded; you can review them by printing the History File. The most recent 16 codes displayed on an NT8D01 Controller Card stay in memory. You can review them and reset the counter through the Network and Signaling Diagnostic (LD 30). You should examine previous codes, system messages, and visual indicators with the current maintenance display code to properly analyze faults.

Table 4 lists the cards with maintenance displays and the type of fault they might indicate.

Table 4
Maintenance display locations and related fault types

Maintenance display	Type of fault
QPC580 CPU Interface Card	Common equipment
QPC584 Mass Storage Interface Card	
NT9D34 Enhanced Mass Storage Interface Card	
NT8D19 Memory/Peripheral Signaling Card	
QPC742 Floppy Disk Interface Card	
NTND01 Integrated CPU/Memory Card	
NT5D20 IODU	
NT6D66, NT9D19, NT5D10 Call Processor	
NT6D63 Input/Output Processor	
NT5D61 Input/Output Disk Unit with CD-ROM	
NT8D01 Controller Card	Peripheral equipment
NT1P62 Fibre Controller Card	
NT7R52 Remote Carrier Interface Card	

User reports

Many faults reported by users, such as a damaged telephones or data sets, are obvious and can be fixed by replacing the damaged equipment.

Some faults are less obvious and may be caused by other equipment, such as a defective peripheral equipment card. To classify the fault in these cases, check for system messages and visual fault indications. You may also have the user reproduce the problem so you can determine the sequence of events that led to the fault.

Table 5 lists typical problems reported by users and the type of fault they might indicate.

Table 5
User reported problems and related fault types

User report	Type of fault
Major alarm reported by attendant No ring on 500/2500 telephones	Power
Major alarm reported by attendant	Common equipment
Minor alarm reported by attendant Cannot transfer or conference Cannot dial out on 500/2500 telephones	Network equipment
Trouble with calls on attendant console Trouble with calls on 500/2500 telephones Trouble with calls on SL-1, M1000, or digital telephones	Peripheral equipment
Trouble with a specific trunk Continuous ringing Trouble with calls on console and/or telephones	Trunk
Trouble with calls Trouble with equipment (such as handset, headset, or display)	Attendant console
Trouble with calls Trouble with equipment (such as handset or add-on module)	Telephone

Accessing the system

When you replace equipment, you often send commands to the system software in order to disable faulty equipment and enable and test newly installed equipment.

You send maintenance commands to the system through the system terminal or the maintenance telephone. This chapter gives the procedures for accessing the system through these devices.

Note: With software prior to X11 release 19, only one device at a time can communicate with the system. Accessing a device while another is logged in will log out the device that was already connected. The Multi User Login feature, available with X11 release 19, allows more than one device to interact with the Meridian 1. Refer to *X11 system management applications* (553-3001-301) for detailed information on using this feature.

Access through the system terminal

You can send maintenance commands and receive system messages by accessing the CPU through an RS-232 device, such as a video display terminal (VDT) or teletypewriter (TTY).

When you access the system through a system terminal, a login procedure is required (see Procedure 2). All system passwords are initially set as 0000, but you can change passwords in the Configuration Record (LD 17).

Note: If a sysload occurs before you save a new password in a data dump, the last active password remains valid.

Each system has two levels of passwords: level 1 is for general use; level 2 is for administrative use. Either password is accepted in the login procedure.

Procedure 2
Access through the system terminal

- 1 Press the return key.
 - If the response is a period (.), you are ready to log in to the system.
 - If the response is
OVL111 nn TTY x or **OVL111 nn SL1**
someone else is logged in to the system. When they have logged off, press return and go to Step 2.
 - If the response is
OVL111 nn IDLE or **OVL111 nn BKGD**
you are ready to log in to the system. Go to Step 2.
 - If the response is
OVL000 >
you are already logged in to the system. Go to Step 4.

Note: Responses vary with different Background Terminal packages.

- 2 Log in to the system by entering:
LOGI
then press the return key.

The normal response is
PASS?
If there is any other response, see the *X11 system messages guide*.
- 3 Enter either the level 1 or level 2 password and press the return key.
If the password is correct, the system responds with the prompt
>
- 4 Load a program by entering:
LD xx "xx" represents the number of the program
- 5 Perform tasks.
- 6 End the program by entering:
END or ****
- 7 Always end the login session with
LOGO
Background routines are then loaded automatically.

Access through the maintenance telephone

A telephone functions as a maintenance telephone when you define the class of service as MTA (maintenance set allowed) in the Multi-line Telephone Administration program (LD 11). A maintenance telephone allows you to send commands to the system through the following maintenance overlays: LD 30, LD 32, LD 33, LD 34, LD 35, LD 36, LD 37, LD 38, LD 41, LD 42, LD 43, LD 45, LD 46, LD 60, LD 61, LD 62.

Note: The Core Common Equipment Diagnostic Program (LD 135) and Core I/O Diagnostic Program (LD 137) are among the overlays that cannot be accessed through a maintenance telephone.

You can test tones and outpulsing through the maintenance telephone. Specific commands for those tests are given in the Tone and Digit Switch and Digitone Receiver Diagnostic (LD 34).

To access the system using the maintenance telephone, see Procedure 3. To enter commands, press the keys that correspond to the letters and numbers of the command (for example, to enter *LD 42 return*, key in *53#42##*). Table 6 shows the translation from a terminal keyboard to a telephone dial pad.

Note: To use the maintenance telephone, the peripheral equipment loop for that telephone must be operating.

Table 6
Translation from keyboard to telephone dial pad

Keyboard				Dial pad
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
			Space or #	#
			Return	##
			.	.
Note: There is no equivalent for Q or Z on a dial pad.				

Procedure 3 Access through the maintenance telephone

- 1 Press the prime DN key.
- 2 Place the set in maintenance mode by entering:
xxxx91 "xxxx" is the customer Special Prefix (SPRE) number. It is defined in the Customer Data Block and can be printed using LD 21. The SPRE number is typically "1" (which means you would enter 191).
- 3 Check for busy tone by entering "return"
##
 - If there is no busy tone, go to Step 4.
 - If there is a busy tone, a program is active. To end an active program and access the system enter

- 4 Load a program by entering:
53#xx## "xx" represents the number of the program
- 5 Perform tasks.
- 6 Enter ******** to exit the program and return the telephone to call processing mode. Background routines are then loaded automatically.

Clearing power faults

Symptoms:

Main circuit breaker and all LEDs off (option 21A)	27
Main circuit breaker on but all LEDs off (option 21A)	28
Green LED off on module power supply (option 21A)	29
Circuit breakers and all column LEDs off (DC power)	30
Circuit breakers on but all column LEDs off (DC power)	32
Green LED off on module power supply (DC power)	33
Defective blower unit indicated (DC power)	35
Main circuit breaker and all column LEDs off (AC power)	36
Main circuit breaker on but all column LEDs off (AC power)	38
Breaker off on MPDU (AC power)	39
Green LED off on module power supply (AC power)	41
Defective blower unit indicated (AC power)	43

Power faults

Various electrical voltages are required to power the Meridian 1. These electrical voltages are developed and delivered by the power equipment system. Cooling and monitoring devices are interconnected with the power system. Figures 1, 2, and 3 show power, cooling, and monitoring equipment that may be located in a column, including:

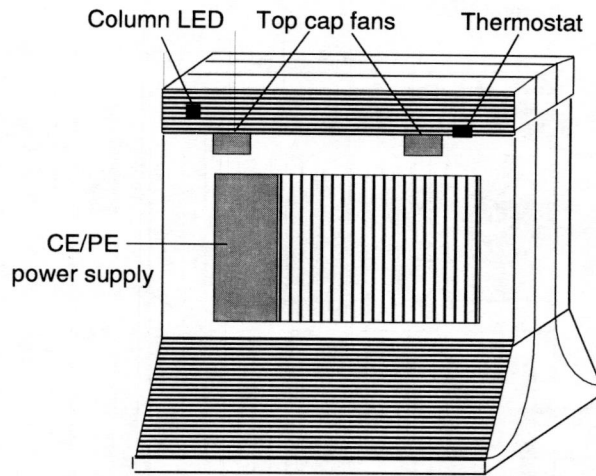
- air probe: increases the impeller speed as the temperature goes up (not equipped in option 21A)
- blower unit: provides cooling for the column (not equipped in option 21A)
- module power distribution unit (MPDU): houses circuit breakers for some module power supplies (AC power only and not equipped in option 21A)

Note: In DC-powered systems, there is a switch on each power supply, so MPDUs are not required.

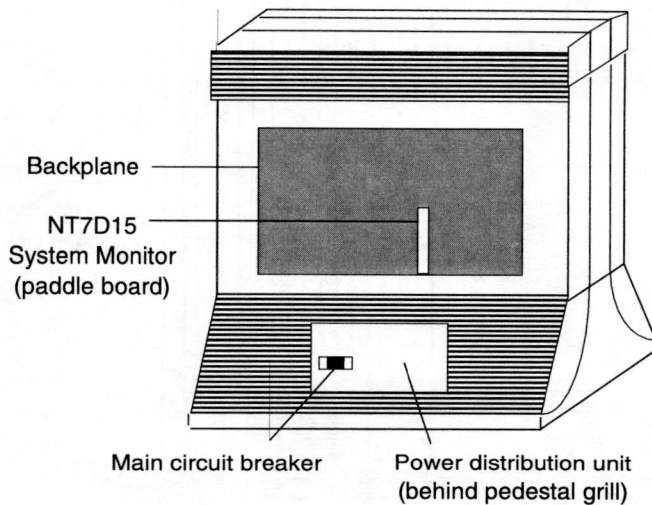
- power distribution unit (PDU): distributes power from the external source to module power supplies and houses the column circuit breaker(s)
- module power supply: converts voltage from the PDU to the voltages needed in each type of module
- ringing generator: provides current to ring 500/2500 telephones and to light the message waiting light on the 2500 telephones
- system monitor: monitors power and temperature conditions
- thermostat: monitors column temperature
- top cap fan: cools the power supply (option 21A only)

Power faults can disable ringing for 500/2500 telephones, message waiting lights on 2500 telephones, all the cards in a module, all the modules in a column, or the entire system.

Figure 1
Power equipment—option 21A



Front of the column



Rear of the column

553-3042

Figure 2
Internal DC power equipment

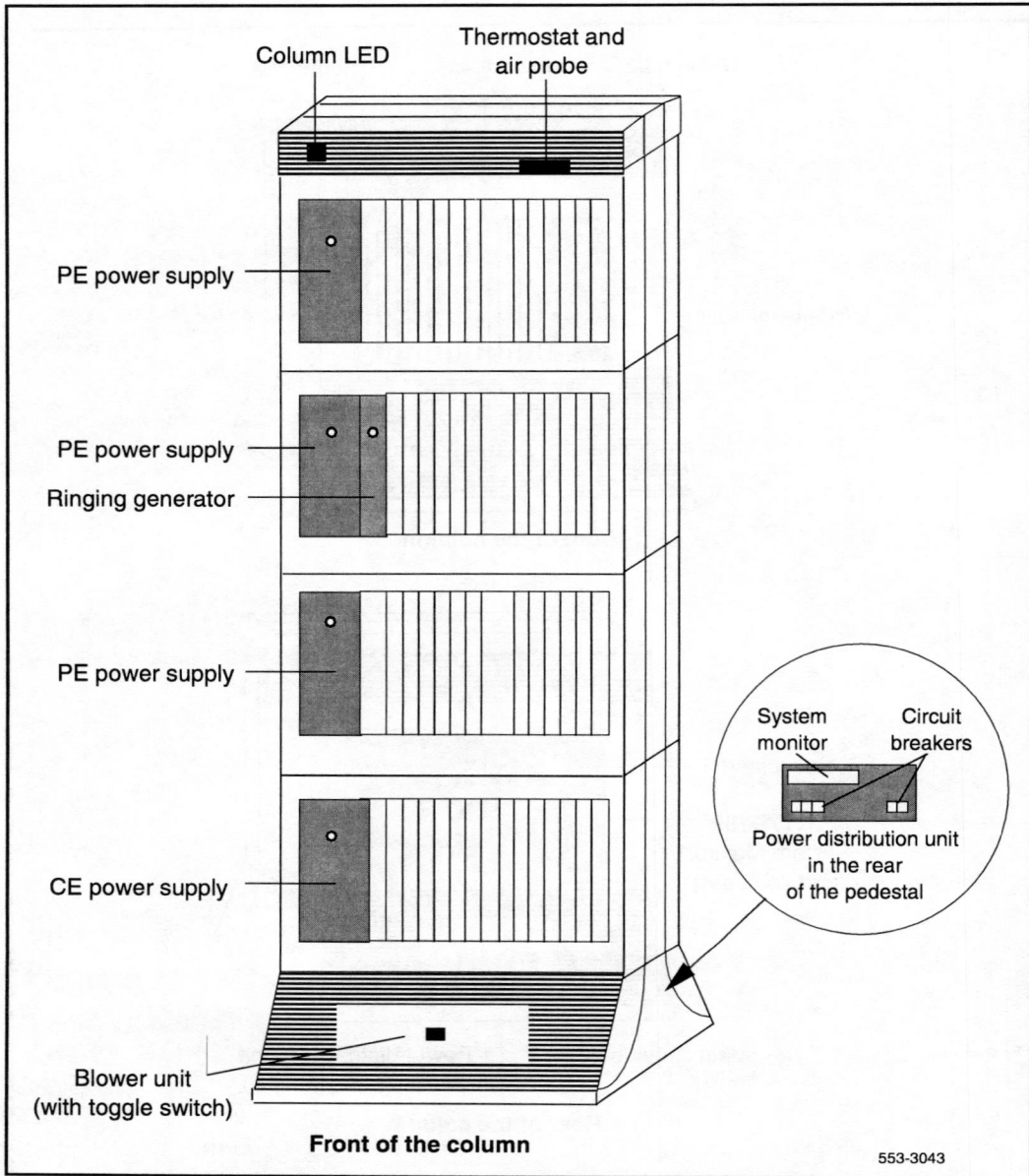
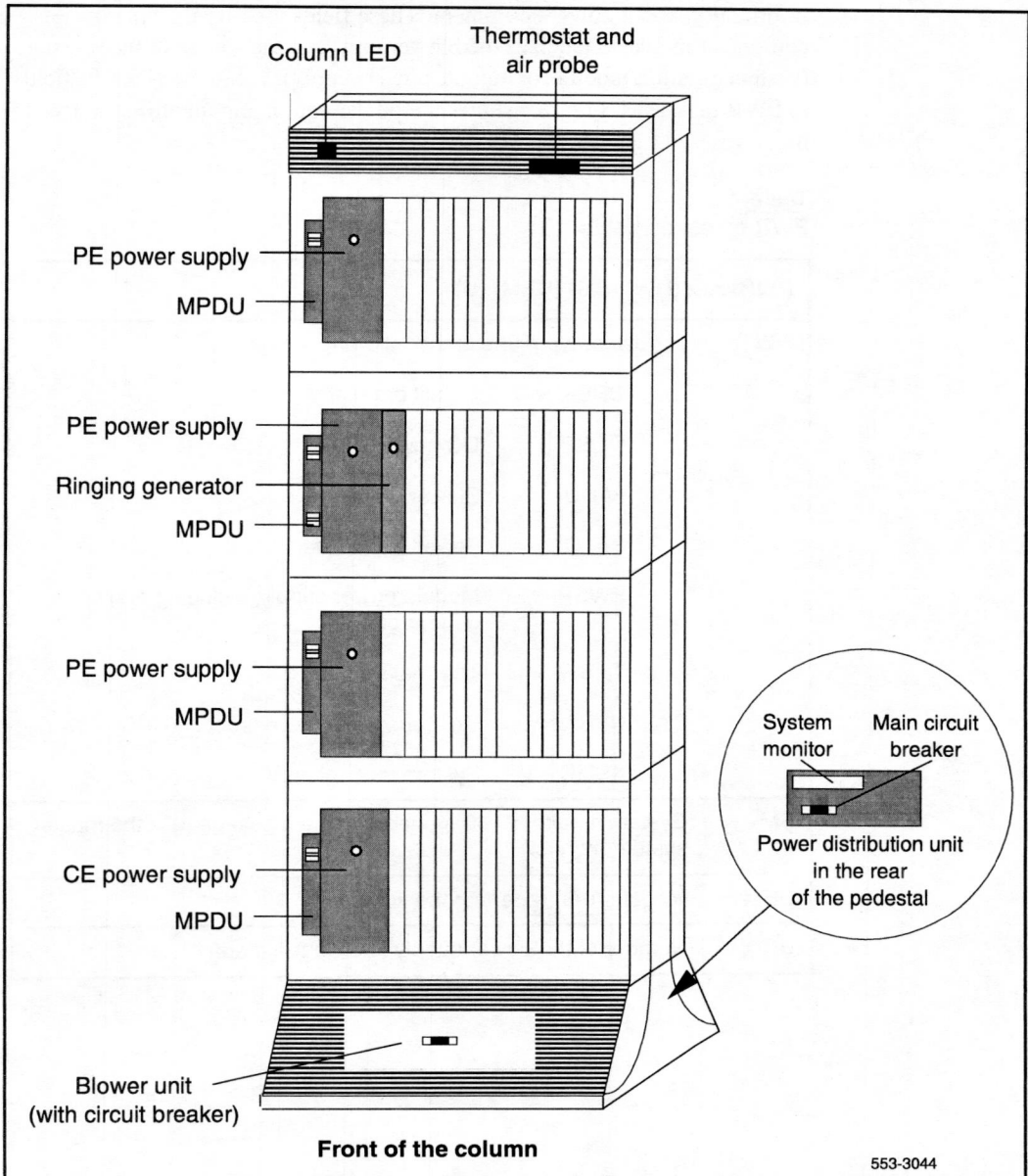


Figure 3
Internal AC power equipment (except option 21A)



Fault clearing procedures

System messages with the mnemonic PWR (power) contain four fields of information about power equipment. These fields identify the type of equipment indicated (such as the blower unit) and the source of the message (system monitor, module, or module power supply). Table 7 defines the fields in PWR messages. Figure 4 shows the power equipment identified in PWR messages.

Table 7
PWR message fields

PWRxxxx (HW) (SM) (UEM) (U)	
HW	Hardware type, one of the following: CRBK Circuit breaker DCSP DC power supply FANU Blower unit PFTC Power fail transfer PWSP Module power supply, including ringing generator THSW Thermal switch UPSA Uninterruptible power supply (UPS) alarm XSMC System monitor card
SM	System monitor (0-63) generating the message (0 is the master system monitor)
UEM	Module (0-3) reporting the condition
U	Number of the power supply (1-2) in the module

Figure 4
Power equipment designations

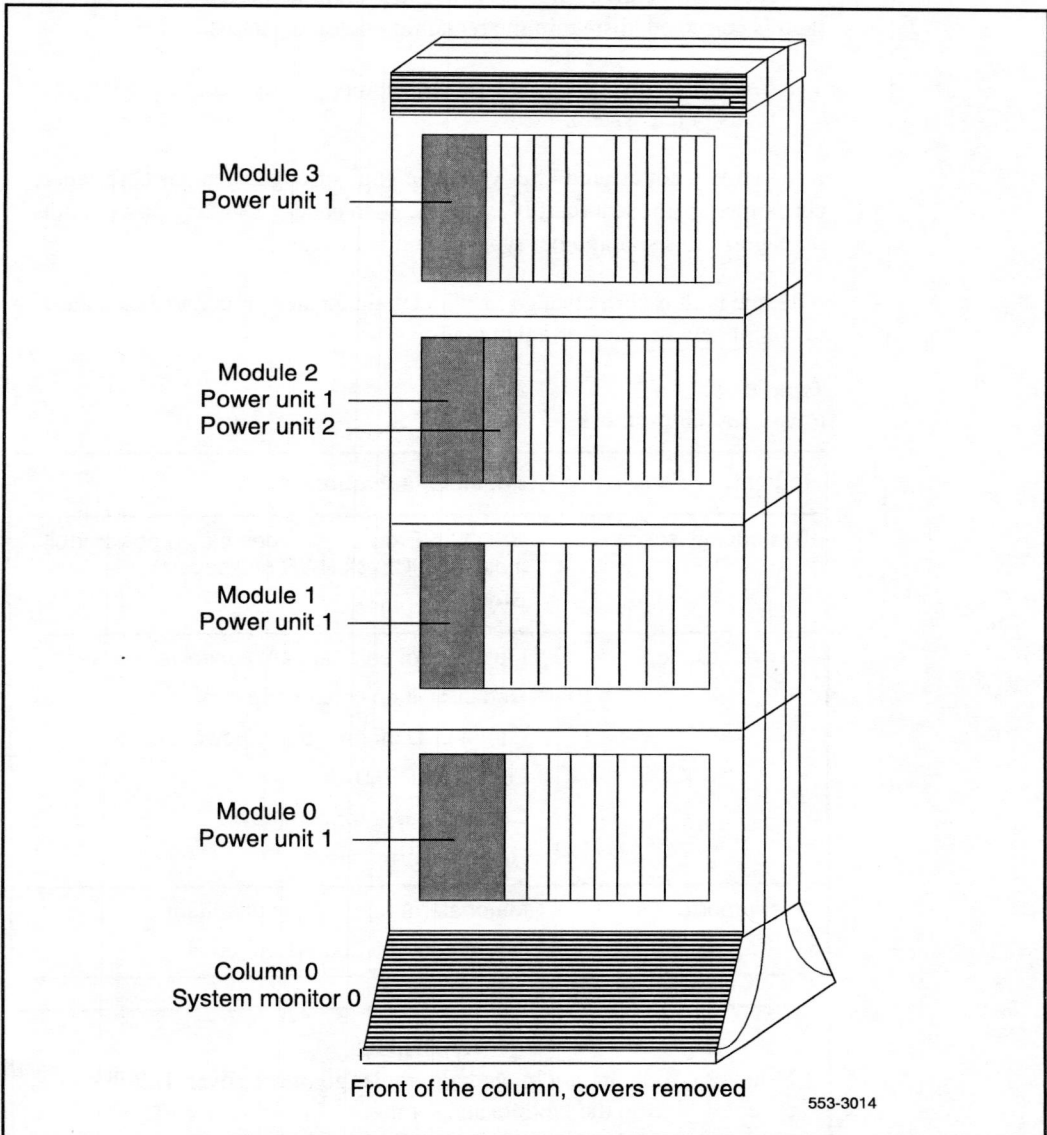


Table 8 lists common power fault indications. To clear faults, select the symptom that most resembles the fault indications, then go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: You must clear power faults before you try to clear other types of faults in the system.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check "Clearing power faults" on page 19 to see if another type of fault is indicated.

After the fault is corrected, go to "Final maintenance procedure" on page 177 to completely restore normal operation.

Table 8
Power fault indicators

Indicator	Possible indications
System messages	BSD090 (Program has detected a power fault indication. Check PWR messages.) PWR messages
Visual indicators	Major alarm on attendant consoles Red LED lit on column top cap Green LED off on module power supply LED lit on PFTU Circuit breaker tripped (down) Remote alarm
User reports	Major alarm reported by attendant No ring on 500/2500 telephones

WARNING

Modules covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Symptom:**Main circuit breaker and all LEDs off (option 21A)**

All the LEDs in the system are off and the main circuit breaker on the PDU is tripped. Use this procedure to clear the problem.

Note: High room temperature or a power surge can shut down the system. Check the temperature of the room and voltages at the commercial power outlet.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Thermostat harness: NT8D46AC
- Top cap fan: A0321130
- System monitor cables

Possible cause	Action
Short circuit or damage	<p>Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment.</p> <p>If you do not find a problem of this type, go to the next possible cause.</p>
Thermal overload	<p>Make sure nothing is blocking ventilation throughout the system. Allow the system to cool for a few minutes, then reset the breaker.</p> <p>If the breaker trips immediately, check the thermostat harness:</p> <ul style="list-style-type: none"> — Make sure the harness is securely connected to the module. — Use an ohmmeter to check the connector pins for the harness; if there is an open circuit between pins 3 and 4 or between pins 5 and 6, replace the harness. <p>If the breaker does not trip immediately, listen for the sound of the top cap fan. If you do not hear the fan, replace it.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>
Defective connection to system monitor	<p>Make sure the cable to connector J3 is securely connected to the system monitor. Also check the system monitor connection to the module.</p> <p>If the breaker trips with all cables connected, replace the cables one at a time until the breaker stays on.</p>

Symptom:

Main circuit breaker on but all LEDs off (option 21A)

All the LEDs in the system are off but the main circuit breaker on the PDU is not tripped. Use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- PDU: NT8D53AD
- Main power cord
- UPS

Possible cause	Action
Power cord not connected	<p>If the power cord for the column is unplugged, plug it in.</p> <p>If the power cord is already plugged in or if the column LEDs do not light and the breaker trips when reset, go to the next possible cause.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>WARNING</p> <p>The following tests are performed on a live power connection.</p> </div>	
No power at outlet	<p>With a meter or test lamp, test for AC power at the outlet.</p> <p>If there is no power at the outlet when AC power is supplied through a UPS unit, repair or replace the UPS following the manufacturer's instructions.</p> <p>If there is no power at the outlet when AC power is supplied through commercial service (not through a UPS), take the necessary steps to have the commercial power restored.</p> <p>If there is power at the outlet, go to the next possible cause.</p>
Defective power cord	<p>With a meter or test lamp, test the field wiring connections (behind the PDU) for AC power.</p> <p>If there is no power, replace the power cord.</p> <p>If there is power at the connections, go to the next possible cause.</p>
Defective PDU	Replace the PDU.

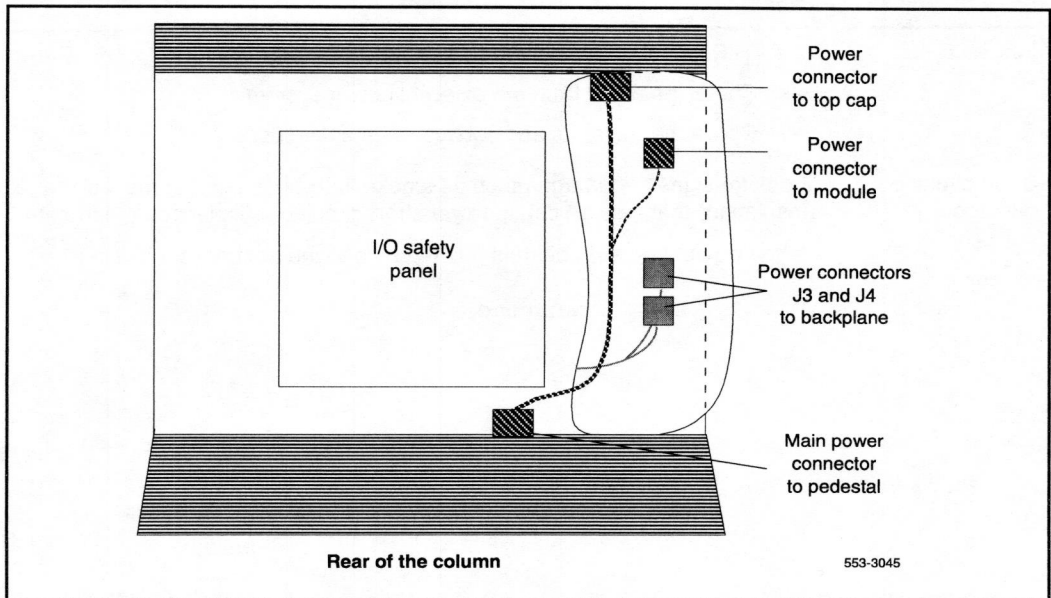
Symptom:**Green LED off on module power supply (option 21A)**

The green LED is off on the CE/PE power supply, but the main circuit breaker on the PDU is not tripped. Use this procedure to clear the problem.

You may need to replace the NT7D14 CE/PE Power Supply. Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520).

Possible cause	Action
Disconnected power cable	Check the power cable connection to the power supply (see Figure 5). If all power cables are connected, go to the next possible cause.
Defective power supply	Set the switch on the power supply to OFF (down), wait at least 60 seconds, then set the switch back to ON (up). If the LED on the power supply is still off, replace the power supply.

Figure 5
Option 21A power cabling in rear of column



Symptom:

Circuit breakers and all column LEDs off (DC power)

All the LEDs in a column are off and all circuit breakers on the PDU are tripped. You may receive message PWR0004, which indicates that the circuit breakers for the column have tripped. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Note: High room temperature can shut down the system. If all columns in a multi-column system are shut down, check for this external condition.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Air filter: P0699798
- Air probe harness: NT8D46AM
- System monitor cables
- Thermostat harness: NT8D46AC

Possible cause	Action
Low batteries	<p>If a TRIP signal to the system has shut down power:</p> <ul style="list-style-type: none"> — Check the cable from the external power system. — Check the batteries and service them as necessary.
Short circuit or damage	<p>Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment.</p> <p>If you do not find a problem of this type, go to the next possible cause.</p>

(continued)

Possible cause	Action
Thermal overload	<p>Make sure nothing is blocking ventilation throughout the system. Allow the system to cool for a few minutes, then reset the breakers.</p> <p>If the breakers trip immediately, check the thermostat harness:</p> <ul style="list-style-type: none"> — Make sure the harness is securely connected to the module below it. — Use an ohmmeter to check the connector pins for the harness; if there is an open circuit between pins 3 and 4 or between pins 5 and 6, replace the harness. <p>If the breakers do not trip immediately, check the air filter:</p> <ul style="list-style-type: none"> — If the filter is dirty and undamaged, clean the filter as described in <i>Meridian 1 general maintenance information</i> (553-3001-500). — If the filter is damaged in any way, replace the filter as described in <i>Meridian 1 hardware replacement</i> (553-3001-520). <p>If there is no problem with the air filter or if the breakers trip when reset, check the air probe harness:</p> <ul style="list-style-type: none"> — Make sure the harness is securely connected to the module below it. — Use an ohm meter to check the connector pins for the harness; if there is an open circuit between pins 1 and 2, replace the harness. <p>If there is no problem with this equipment, go to the next possible cause.</p>
Defective connection to system monitor	<p>Make sure cables to connectors J5 and J6 are securely connected to the system monitor in the column.</p> <p>Check the system monitor connections to each module.</p> <p>If the breakers trip with all cables connected, replace the cables one at a time until the breakers stay on.</p>

Symptom:

Circuit breakers on but all column LEDs off (DC power)

All the LEDs in a column are off but the circuit breakers on the PDU are not tripped. Use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- External rectifier
- PDU

Possible cause	Action
DC wires not connected	<p>If the DC wires are disconnected, connect them.</p> <p>If the wires are already connected or if the column LEDs do not light when they are connected, go to the next possible cause.</p>
<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>WARNING</p> <p>The following test is performed on a live power connection.</p> </div>	
No power at DC source	<p>Make sure the rectifier is on and connected.</p> <p>Make sure the rectifier is receiving power.</p> <p>If there is no problem with the rectifier, go to the next possible cause.</p>
Defective power cable	<p>With a meter, test the field wiring connections in the PDU for DC power.</p> <p>If there is no power, replace the cable.</p> <p>If there is power at the connections, go to the next possible cause.</p>
Defective PDU	Replace the PDU.

Symptom:**Green LED off on module power supply (DC power)**

The green LED is off on one of the following power supplies:

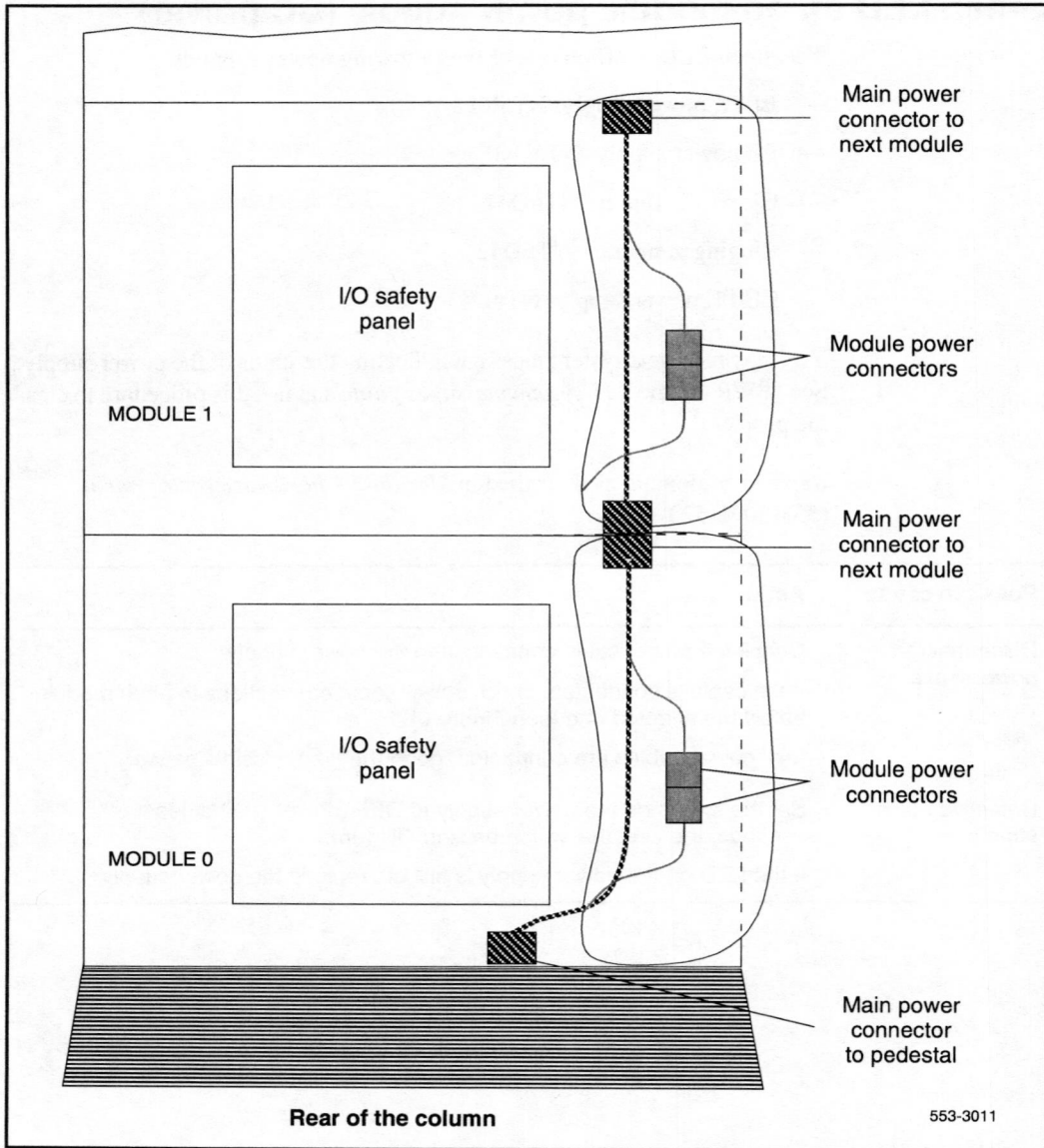
- EEPE power supply: NT5K12
- PE power supply: NT6D40
- CE power supply: NT6D41
- Ringing generator: NT6D42
- CE/PE power supply: NT6D43

You may receive a system message indicating the status of the power supply. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520).

Possible cause	Action
Disconnected power cable	<p>Check the power cable connection to the power supply.</p> <p>If the cable is connected, check power cable connections to each module below the affected one (see Figure 6).</p> <p>If all power cables are connected, go to the next possible cause.</p>
Defective power supply	<p>Set the switch on the power supply to OFF (down), wait at least 60 seconds, then set the switch back to ON (up).</p> <p>If the LED on the power supply is still off, replace the power supply.</p>

Figure 6
DC power cabling in rear of column



Symptom:**Defective blower unit indicated (DC power)**

The blower unit circuit breaker (breaker number 5 on the PDU) is tripped and trips when reset. You may receive a system message indicating that there is a failure in the blower. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Blower unit: NT8D52DD
- PDU

Possible cause	Action
Blower unit switch turned off	Set the switch on the front of the blower unit to ON (right). Reset the circuit breaker. If the switch was already on or if the circuit breaker trips again, go to the next possible cause.
Defective blower unit	Replace the blower unit and set the circuit breaker to on. If the breaker trips, go to the next possible cause.
Defective PDU	Replace the PDU.

Symptom:

Main circuit breaker and all column LEDs off (AC power)

All the LEDs in a column are off and the main circuit breaker on the PDU is tripped. You may receive message PWR0004, which indicates that the main circuit breaker for the column has tripped. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Note: High room temperature or a power surge can shut down the system. If all columns in a multi-column system are shut down, check for these external conditions.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Air filter: P0699798
- Air probe harness: NT8D46AM
- System monitor cables
- Thermostat harness: NT8D46AC

Possible cause	Action
Short circuit or damage	Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment. If you do not find a problem of this type, go to the next possible cause.
Thermal overload	Make sure nothing is blocking ventilation throughout the system. Allow the system to cool for a few minutes then reset the breaker. If the breaker trips immediately, check the thermostat harness: <ul style="list-style-type: none"> — Make sure the harness is securely connected to the module below it. — Use an ohmmeter to check the connector pins for the harness; if there is an open circuit between pins 3 and 4 or between pins 5 and 6, replace the harness.

(continued)

Possible cause	Action
	<p>If the breakers do not trip immediately, check the air filter:</p> <ul style="list-style-type: none">— If the filter is dirty and undamaged, clean the filter as described in <i>Meridian 1 general maintenance information</i> (553-3001-500).— If the filter is damaged in any way, replace the filter as described in <i>Meridian 1 hardware replacement</i> (553-3001-520). <p>If there is no problem with the air filter or if the breaker trips when reset, check the air probe harness:</p> <ul style="list-style-type: none">— Make sure the harness is securely connected to the module below it.— Use an ohm meter to check the connector pins for the harness; if there is an open circuit between pins 1 and 2, replace the harness. <p>If there is no problem with this equipment, go to the next possible cause.</p>
Defective connection to system monitor	<p>Make sure cables to connectors J5 and J6 are securely connected to the system monitor in the column.</p> <p>Check the system monitor connections to each module.</p> <p>If the breaker trips with the cables connected, replace the cables one at a time until the breaker stays on.</p>

Symptom:

Main circuit breaker on but all column LEDs off (AC power)

All the LEDs in the column are off but the main circuit breaker on the PDU is not tripped. Use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- PDU: NT8D53AB
- Main power cord
- UPS

Possible cause	Action
Power cord not connected	<p>If the power cord for the column is unplugged, plug it in.</p> <p>If the power cord is already plugged in or if the column LEDs do not light when it is plugged in, go to the next possible cause.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>WARNING</p> <p>The following tests are performed on a live power connection.</p> </div>	
No power at outlet	<p>With a meter or test lamp, test for AC power at the outlet.</p> <p>If there is no power at the outlet when AC power is supplied through a UPS unit, repair or replace the UPS following the manufacturer's instructions.</p> <p>If there is no power at the outlet when AC power is supplied through commercial service (not through a UPS), take the necessary steps to have the commercial power restored.</p> <p>If there is power at the outlet, go to the next possible cause.</p>
Defective power cord	<p>With a meter or test lamp, test the field wiring connections in the PDU for AC power.</p> <p>If there is no power, replace the power cord.</p> <p>If there is power at the connections, go to the next possible cause.</p>
Defective PDU	Replace the PDU.

Symptom:**Breaker off on MPDU (AC power)**

A circuit breaker on a MPDU is tripped and trips when reset. The green LED will be off on the associated power supply:

- NT8D56AA single breaker MPDU: for NT8D29 CE Power Supply
- NT8D56AC single breaker MPDU: for NT7D14 CE/PE Power Supply
- NT8D57AA dual breaker MPDU: for NT8D06 PE Power Supply and NT8D21 Ringing Generator

You may receive a system message indicating the status of the breaker. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520).

Possible cause	Action
Short circuit or damage	Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment. If you do not find a problem of this type, go to the next possible cause.
Defective module power supply (single breaker)	Unseat the associated power supply and reset the breaker. If the breaker does not trip, replace the power supply. If the breaker trips, replace the MPDU.
Defective module power supply (dual breaker)	If one circuit breaker is tripped on a dual MPDU: <ul style="list-style-type: none"> — Unseat the associated power supply (see Figure 7) then reset the breaker. — If the breaker does not trip, replace the power supply. — If the breaker trips, replace the MPDU.

(continued)



Symptom:**Green LED off on module power supply (AC power)**

The circuit breaker on the associated MPDU is not tripped, but the green LED is off on one of the following power supplies:

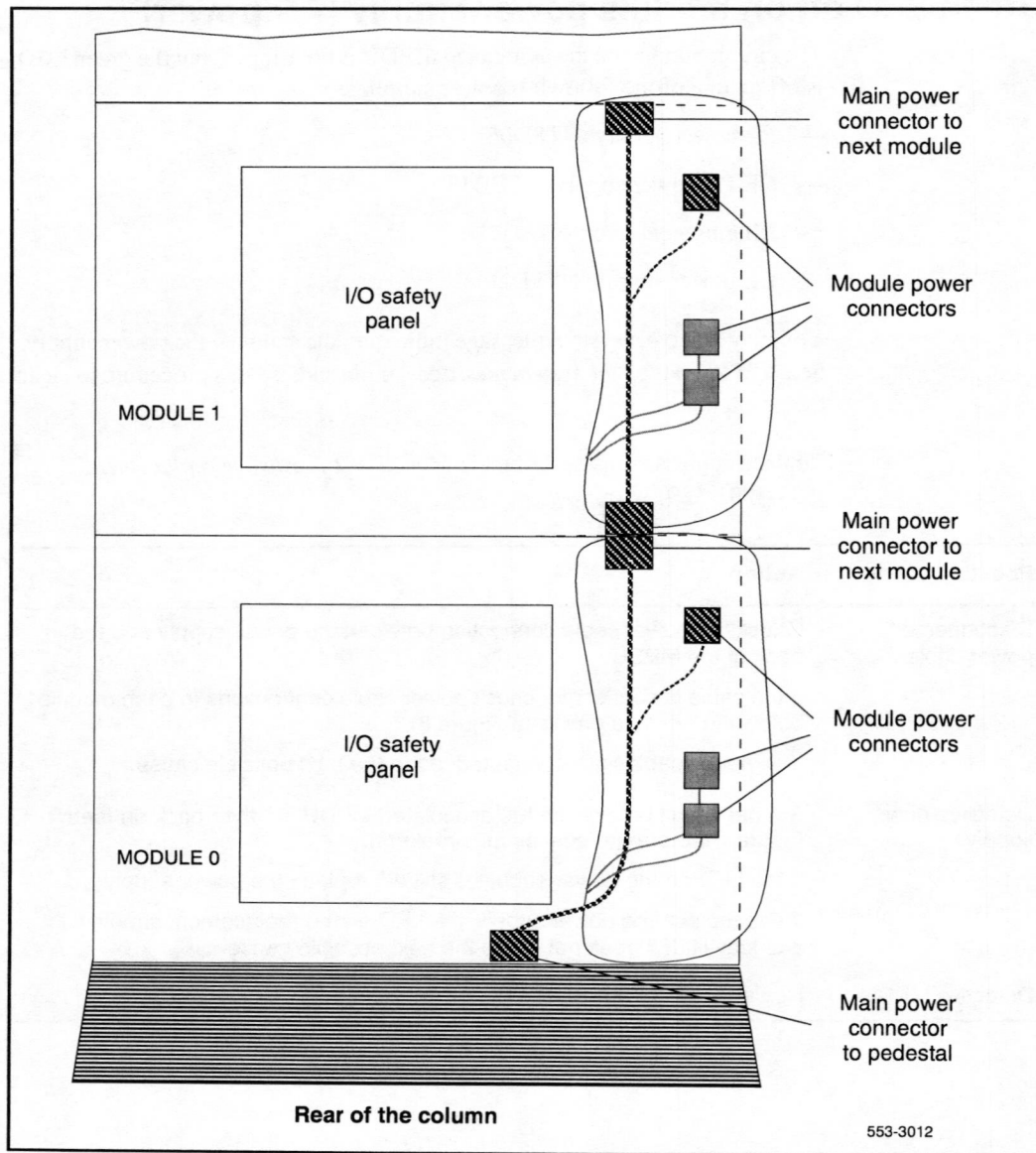
- PE power supply: NT8D06
- CE/PE power supply: NT7D14
- Ringing generator: NT8D21
- CE power supply: NT8D29

You may receive a system message indicating the status of the power supply. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520).

Possible cause	Action
Disconnected power cable	<p>Check the power cable connection between the power supply and the back of the MPDU.</p> <p>If the cable is connected, check power cable connections to each module below the affected one (see Figure 8).</p> <p>If all power cables are connected, go to the next possible cause.</p>
Defective power supply	<p>Set the circuit breaker on the associated MPDU off, then back on (see Figure 7 if there are dual circuit breakers).</p> <p>If the LED on the power supply is still off, replace the power supply.</p> <p>If you replace the power supply, the LED on the replacement should light and stay lit. If it does not, go to the next possible cause.</p>
Defective MPDU	<p>Replace the MPDU.</p>

Figure 8
AC power cabling in rear of column



Symptom:**Defective blower unit indicated (AC power)**

The blower unit circuit breaker (located on the front of the unit) is tripped and trips when reset. You may receive a system message indicating that there is a failure in the blower. See “PWR” in the *X11 system messages guide* and use this procedure to clear the problem.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Blower unit: NT8D52AB
- PDU: NT8D53

Possible cause	Action
Defective blower unit	Replace the blower unit and set the circuit breaker to ON (up). If the breaker trips, go to the next possible cause.
Defective PDU	Replace the PDU.

Clearing common equipment faults

Symptoms:

Call processing stopped (options 21A and 21)	49
Call processing stopped (option 21E)	51
Fault indicated on memory/peripheral signaling card (options 21A and 21)	54
Fault indicated on MSPS card (option 21E)	55
Fault indicated on the CPU card (options 21A and 21)	56
Fault indicated on the ICM card (option 21E)	58
Call processing stopped (option 51)	60
Fault indicated on memory card (option 51)	63
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Common equipment faults

Common equipment (CE) functions perform system control and switching. Common equipment in the Meridian 1 can include:

- Bus Terminating Unit (BTU): provides logical termination to CPU and network buses (options 51, 51C, 61, 61C, 71, 81, and 81C)
- Changeover and Memory Arbitrator (CMA) card: provides CPU access to RAM memory; allows a CPU to access redundant memory in a dual CPU system (options 51, 61, and 71)
- Central Processing Unit (CPU): performs system call processing functions
- Call Processor (CP): performs system arithmetic and logic functions
- Data cartridge: allows access to software packages purchased
- Mass Storage Interface card (floppy disk interface card, mass storage interface card, or enhanced mass storage interface card): interface between the CPU and the mass storage unit
- Mass Storage Unit (floppy disk unit, multi drive unit, small system multi drive unit, or core multi disk unit): provides a backup for programs and data stored in system memory
- Read Only Memory (ROM) card: provides memory for the CPU; the daughterboard on the QPC687 CPU Card (options 21, 21A), the NTND01 ICM Card (option 21E), the QPC579 CPU Function Card (options 51, 61, 71), or the NT6D66 Call Processor (options 51C, 61C, 81, and 81C)
- Serial Data Interface (SDI) card: provides ports between the CPU and external devices
- Segmented Bus Extender (SBE) card: extends the CE bus signals to the network module (option 71)
- Core to Network Interface (CNI) card: links the CE bus with the three-port extender (3PE) card(s) in the network slots (options 51C, 61C, 81, and 81C)

- Three-Port Extender (3PE) card: extends CPU signals to the network (option 61), between the SBE and the network (option 71), and between Core Network Interface (CNI) and the network (options 51C, 61C, 81, and 81C).

Common equipment faults can disable the CPU or the mass storage unit and stop call processing. In addition, other types of equipment (such as network equipment) may not operate properly while there is a CE fault in the system.

Fault clearing procedures

Table 9 lists common equipment fault indications. To clear faults, select the symptom that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: Clear any power faults before you try to clear common equipment faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 3 to see if another type of fault is indicated.

After the fault is corrected, go to “Final maintenance procedure” on page 177 to completely restore normal operation.

WARNING

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Table 9
Common equipment fault indicators

Indicator	Possible indications
System messages	BSD080, 085, 086, 103 CED messages INI001, 002, 004, 005 IOD006, 007, 060, 061, 291–297 NWS030, 102, 103, 142 SYS messages
Visual indicators	Major alarm on attendant consoles Red LED lit on column top cap Red LED lit on CE card of active CPU
Maintenance displays	QPC580 CPU Interface NT8D19 Memory/Peripheral Signaling QPC584 Mass Storage Interface NT9D34 Enhanced Mass Storage Interface QPC742 Floppy Disk Interface NTND01 ICM card NT5D20 IOP/CMDU NTND10 CMA card NT6D66, NT9D19, NT5D10 Call Processor NT6D63 IOP card NT5D61 IODU/C card
User reports	Major alarm reported by attendant

Symptom:**Call processing stopped (options 21A and 21)**

Call processing has stopped on a single CPU system. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up codes and system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CPU card: QPC687
- Data cartridge: QMM42
- FDI card: QPC742
- FDU: NT8D68
- Memory/peripheral signaling card: NT8D19
- ROM card: QPC940
- CE/PE card cage: NT8D1103

Possible cause	Action
Defective module power supply	<p>Make sure the green LED on the CE/PE power supply is lit. If it is not lit, go to "Clearing power faults" on page 19.</p> <p>If the power supply LED is lit, go to the next possible cause.</p>
Initialization required	<p>Press the manual initialize (Man Int) button on the memory/peripheral signaling card. If the system initializes, check all fault indicators and clear any faults indicated.</p> <p>If the system does not initialize, unseat network cards one at a time. If the system initializes, replace the last card you removed (it is faulty).</p> <p>If the system will not initialize, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective FDI card or FDU	<p>Unseat the FDU and FDI card, then reinstall them. Make sure the cable between the FDU and FDI card is securely connected. If the system does not recover, continue with this procedure.</p> <p>If a disabled FDI card is indicated, make sure the data cartridge is securely attached:</p> <ul style="list-style-type: none"> — Check the switch settings; if necessary, correct the switch settings. — Try to enable the FDI card (try to software disable, hardware disable, then reenable). — If you cannot load a program or the FDI is still disabled, replace it. — If necessary, replace the data cartridge. <p>If a disabled FDU is indicated:</p> <ul style="list-style-type: none"> — replace it — if the FDU is still disabled, replace the cable between the FDU and FDI card <p>If the system does not recover, go to the next possible cause.</p>
Sysload required	<p>Press the reload (reset) button on the CPU card.</p> <p>If a sysload (reload) occurs, check all fault indicators and clear any faults indicated.</p> <p>If the system will not sysload, go to the next possible cause.</p>
Defective CE card	<p>Unseat the cards, then reinstall them. If the system does not recover, check the CPU card:</p> <ul style="list-style-type: none"> — Make sure the ROM card is properly installed on the CPU card. — Replace the ICPU card. — If necessary, replace the ROM card. <p>If the system will not sysload, replace the memory/peripheral signaling card.</p> <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:**Call processing stopped (option 21E)**

Call processing has stopped on a single CPU system. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up codes and system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- ICM card: NTND01
- Data cartridge: QMM42
- FDI card: QPC742
- EMSI card: NT9D34
- FDU: NTND15
- SMDU: NT9D33
- MSPS card: NTND02
- ROM card: NTND31
- CE/PE card cage: NT8D1103

Possible cause	Action
Defective module power supply	<p>Make sure the green LED on the CE/PE power supply is lit. If it is not lit, go to "Clearing power faults" on page 19.</p> <p>If the power supply LED is lit, go to the next possible cause.</p>
Initialization required	<p>Press the manual initialize (Man Int) button on the ICM card. If the system initializes, check all fault indicators and clear any faults indicated.</p> <p>If the system does not initialize, unseat network cards one at a time. If the system initializes, replace the last card you removed (it is faulty).</p> <p>If the system will not initialize, go to the next possible cause.</p>
Defective FDI card or FDU	<p>Unseat the FDU and FDI card then reinstall them. Make sure the cable between the FDU and FDI card is securely connected. If the system does not recover, continue with this procedure.</p> <p>If a disabled FDI card is indicated:</p> <ul style="list-style-type: none">— Make sure the data cartridge is securely attached.— Check the switch settings; if necessary, correct the switch settings.— Try to enable the FDI card (try to software disable, hardware disable, then reenable).— If you cannot load a program or the FDI is still disabled, replace it.— If necessary, replace the data cartridge. <p>If a disabled FDU is indicated:</p> <ul style="list-style-type: none">— Replace it.— If the FDU is still disabled, replace the cable between the FDU and FDI card. <p>If the system does not recover, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective EMSI card or SMDU	<p>Unseat the SMDU and EMSI card then reinstall them. Make sure the cable between the SMDU and EMSI card is securely connected. If the system does not recover, continue with this procedure.</p> <p>If a disabled EMSI card is indicated:</p> <ul style="list-style-type: none"> — Make sure the data cartridge is securely attached. — Check the switch settings; if necessary, correct the switch settings. — Try to enable the EMSI card (try to software disable, hardware disable, then reenable). — If you cannot load a program or the EMSI is still disabled, replace it. — If necessary, replace the data cartridge. <p>If a disabled SMDU is indicated:</p> <ul style="list-style-type: none"> — Replace it. — If the SMDU is still disabled, replace the cable between the SMDU and SMDU card. <p>If the system does not recover, go to the next possible cause.</p>
Sysload required	<p>Press the reload (reset) button on the ICM card.</p> <p>If a sysload (reload) occurs, check all fault indicators and clear any faults indicated.</p> <p>If the system will not sysload, go to the next possible cause.</p>
Defective CE card	<p>Unseat the cards then reinstall them. If the system does not recover, check the ICM card:</p> <ul style="list-style-type: none"> — Make sure the ROM card is properly installed on the ICM card. — Replace the ICM card. — If necessary, replace the ROM card. <p>If the system will not sysload, replace the MSPS card.</p> <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Fault indicated on memory/peripheral signaling card (options 21A and 21)

The red LED is lit on the memory/peripheral signaling card and call processing has stopped. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CPU card: QPC687
- Memory/peripheral signaling card: NT8D19
- ROM card: QPC940
- CE/PE card cage: NT8D1103

Possible cause	Action
Defective memory/peripheral signaling card	<p>Unseat the card then, reinstall it.</p> <p>If the LED on the card is still lit, replace the card.</p> <p>If the LED turns off but the system does not recover, go to the next possible cause.</p>
Defective CPU card	<p>Unseat the CPU card then reinstall it. If the system does not recover:</p> <ul style="list-style-type: none"> — Make sure the ROM card is properly installed. — As necessary, replace the CPU card and the ROM card. <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:**Fault indicated on MSPS card (option 21E)**

The red LED is lit on the MSPS card and call processing has stopped. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- ICM card: NTND01
- MSPS card: NTND02
- ROM card: NTND31
- CE/PE card cage: NT8D1103

Possible cause	Action
Defective MSPS card	<p>Unseat the card, then reinstall it.</p> <p>Set the Enb/Dis switch on the NT8D18 Network/DTR Card to Dis, then back to Enb.</p> <p>If the LED on the card is still lit, replace the card.</p> <p>If the LED turns off but the system does not recover, go to the next possible cause.</p>
Defective ICM card	<p>Unseat the ICM card then reinstall it. If the system does not recover:</p> <ul style="list-style-type: none"> — Make sure the ROM card is properly installed. — As necessary, replace the ICM card and the ROM card. <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Fault indicated on the CPU card (options 21A and 21)

The red LED is lit on the CPU card. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CPU card: QPC687
- FDI card: QPC742
- Memory/peripheral signaling card: NT8D19
- ROM card: QPC940
- SDI paddle board: NT8D41
- CE/PE card cage: NT8D1103

Possible cause	Action
Defective FDI card (lit LED)	<p>Unseat the card, then reinstall it. If the card does not recover:</p> <ul style="list-style-type: none"> — Make sure the cable between the FDU and FDI card is securely connected. — Check the switch settings; if necessary, correct the switch settings and try to enable the card. — If you cannot load a program or the card will not enable, replace the card. <p>If the CPU is still faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective SDI	<p>Check each SDI port by entering:</p> <p>LD 37 TTY x "x" represents the number of the interface device attached to the port</p> <ul style="list-style-type: none">— If software is disabled, try to enable it (software disable, hardware disable, then reenable).— If the card will not enable, replace it. <p>If the CPU is still faulty, go to the next possible cause.</p>
CPU card (lit LED)	<p>Check the CPU card:</p> <ul style="list-style-type: none">— Make sure the ROM card is properly installed.— As necessary, replace the CPU card and the ROM card. <p>If the CPU is still faulty, replace the memory/peripheral signaling card.</p> <p>If the CPU remains faulty, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Fault indicated on the ICM card (option 21E)

The red LED is lit on the ICM card. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- ICM card: NTND01
- FDI or EMSI card: QPC742, NT9D34
- MSPS card: NTND02
- ROM card: NTND31
- SDI paddle board: NT8D41
- CE/PE card cage: NT8D1103

Possible cause	Action
Defective FDI card (lit LED)	<p>Unseat the card then reinstall it. If the card does not recover:</p> <ul style="list-style-type: none"> — Make sure the cable between the FDU and FDI card is securely connected. — Check the switch settings; if necessary, correct the switch settings and try to enable the card. — If you cannot load a program or the card will not enable, replace the card. <p>If the CPU is still faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective EMSI card (lit LED)	<p>Unseat the card then reinstall it. If the card does not recover:</p> <ul style="list-style-type: none"> — Make sure the cable between the SMDU and EMSI card is securely connected. — Check the switch settings; if necessary, correct the switch settings and try to enable the card. — If you cannot load a program or the card will not enable, replace the card. <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective SDI	<p>Check each SDI port by entering:</p> <p>LD 37 TTY x "x" represents the number of the interface device attached to the port.</p> <ul style="list-style-type: none"> — If software is disabled, try to enable it (software disable, hardware disable, then reenable). — If the card will not enable, replace it. <p>If the CPU is still faulty, go to the next possible cause.</p>
ICM card (lit LED)	<p>Check the ICM card:</p> <ul style="list-style-type: none"> — make sure the ROM card is properly installed — as necessary, replace the ICM card and the ROM card <p>If the CPU is still faulty, replace the MSPS card.</p> <p>If the CPU remains faulty, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Call processing stopped (option 51)

Call processing has stopped on a single CPU system. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure. Before you begin:

- Make sure the normal/maintenance switch on the QPC580 CPU Interface Card is set to Maint.
- Take any action indicated by the maintenance display codes.

Note: Continually observe and look up codes and system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- BTU: QPC477
- CMA card: QPC581 or NTND10
- FN card: QPC579
- IF card: QPC580
- Data cartridge: QMM42
- FDI, MSI, or EMSI card: QPC742, QPC584, NT9D34
- FDU or MDU: NT8D68 or NTND15, NT8D69 or NTND16
- Memory card: QPC583 or NTND09
- ROM card: QPC939 or NTND08
- CPU/network card cage: NT6D3903

Possible cause	Action
Defective module power supply	<p>Make sure the green LED on the CE power supply is lit. If it is not lit, go to "Clearing power faults" on page 19.</p> <p>If the power supply LED is lit, go to the next possible cause.</p>
Initialization required	<p>Press the manual initialize (Man Int) button on the IF card. If the system initializes, clear any faults indicated.</p> <p>If the system does not initialize, unseat network cards one at a time. If the system initializes, replace the last card you removed (it is faulty).</p> <p>If the system will not initialize, go to the next possible cause.</p>
Defective mass storage unit or interface card	<p>Unseat the mass storage unit and interface card, then reinstall them. Make sure the cable between the interface card and the unit is securely connected. If the system does not recover, continue with this procedure.</p> <p>If a disabled FDI, MSI, or EMSI card is indicated:</p> <ul style="list-style-type: none"> — Make sure the data cartridge is securely attached. — Check the switch settings; if necessary, correct the switch settings. — Try to enable the interface card (try to software disable, hardware disable, then reenable). — If you cannot load a program or the interface card is still disabled, replace it. — If necessary, replace the data cartridge. <p>If a disabled FDU or MDU is indicated:</p> <ul style="list-style-type: none"> — Replace it. — If the unit is still disabled, replace the cable between the unit and the interface card. <p>If the system does not recover, go to the next possible cause.</p>
Sysload required	<p>Press the reload (Rld) button on the CMA card.</p> <p>If a sysload (reload) occurs, clear any faults indicated.</p> <p>If the system will not sysload, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective CE card	<p>Unseat the CE cards then reinstall them. If the system does not recover, continue with this procedure. Try to sysload after any card is replaced.</p> <p>Make sure the cable between the IF and FN cards is securely connected.</p> <p>Make sure the CMA cable is securely connected.</p> <p>Check the CPU cards:</p> <ul style="list-style-type: none">— Make sure the ROM card is properly installed on the FN card.— As necessary, replace the IF card, the FN card, the ROM card, and the cable. <p>If the system does not sysload, replace the memory card.</p> <p>If the system does not sysload, replace the CMA card. If necessary, replace the CMA cable.</p> <p>If the system does not sysload, replace the BTU.</p> <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:**Fault indicated on memory card (option 51)**

The red LED is lit on the memory card and call processing has stopped. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CMA card: QPC581 or NTND10
- FN card: QPC579
- IF card: QPC580
- Memory card: QPC583 or NTND09
- ROM card: QPC939 or NTND08
- CPU/network card cage: NT6D3903

Possible cause	Action
Defective memory card	Unseat the card, then reinstall it. If the LED on the card is still lit, replace the card. If the LED turns off but the system does not recover, go to the next possible cause.

(continued)

Possible cause	Action
Defective CE card	<p>Unseat the CE cards then reinstall them. If the system does not recover, continue with this procedure.</p> <p>Make sure the cable between the IF and FN cards is securely connected. Make sure the CMA cable is securely connected.</p> <p>Check the CPU cards:</p> <ul style="list-style-type: none">— Make sure the ROM card is properly installed on the FN card.— As necessary, replace the IF card, the FN card, the ROM card, and the QCAD240 cable between the IF and FN cards. <p>If the system does not recover, replace the CMA card. If necessary, replace the CMA cable.</p> <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:**Fault indicated on a common equipment card (option 51)**

The red LED is lit on a common equipment card, other than the memory card. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Make sure the normal/maintenance switch on the QPC580 CPU Interface Card is set to Maint. Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CMA card: QPC581 or NTND10
- FN card: QPC579
- IF card: QPC580
- FDI, MSI, or EMSI card: QPC742, QPC584, NT9D34
- Memory card: QPC583 or NTND09
- ROM card: QPC939 or NTND08
- SDI cards: NT8D41, QPC513, QPC841
- CPU/network card cage: NT6D3903

Possible cause	Action
Defective FDI, MSI, or EMSI card (lit LED)	<p>Unseat the card, then reinstall it. If the card does not recover:</p> <ul style="list-style-type: none"> — Make sure the cable between the mass storage unit and the interface card is securely connected. — Check the switch settings; if necessary, correct the switch settings and try to enable. — If you cannot load a program or the card will not enable, replace the card. <p>If the CPU is still faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective SDI	<p>Check each SDI port by entering:</p> <p>LD 37 TTY x "x" represents the number of the interface device attached to the port.</p> <ul style="list-style-type: none"> — If software is disabled, try to enable it (software disable, hardware disable, then reenable). — If the card will not enable, replace it. <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective CE card (lit LED)	<p>Unseat the CE cards, then reinstall them. If all cards do not recover, continue with this procedure.</p> <p>If the LED is lit on the IF card:</p> <ul style="list-style-type: none"> — Make sure the cable between the IF and FN cards is securely connected. — Make sure the ROM card is properly installed on the FN card. — As necessary, replace the IF card, the FN card, the ROM card, and the QCAD240 cable between the IF and FN cards. <p>If the LED is lit on the CMA, make sure the CMA cable is securely connected. If the cable is connected, enter:</p> <p>LD 35 STAT CMA x "x" represents the CMA number.</p> <ul style="list-style-type: none"> — If the CMA is disabled, try to enable it (software disable, hardware disable, then try to reenable). — If the card will not enable, replace it. — If the replacement CMA does not enable, replace the cable.

(continued)

Possible cause	Action
	<p>If the LED is lit on the memory card, enter:</p> <p>LD 35</p> <p>STAT MEM x "x" represents a two-digit number—the first digit is the CPU number (0 or 1), the second is the memory card number.</p> <ul style="list-style-type: none">— If the card is disabled, try to enable it (software disable, then reenable): <p>ENL x "x" represents the memory card number.</p> <ul style="list-style-type: none">— If the card will not enable, enter: <p>MEM x</p> <ul style="list-style-type: none">— If the card fails the memory test, replace it. <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective backplane	Replace the card cage assembly in the module.

Symptom:

Call processing stopped (options 61 and 71)

Call processing has stopped on a dual CPU system. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure. Before you begin:

- Make sure the normal/maintenance switch on both QPC580 CPU Interface Cards is set to Norm.
- Take any action indicated by the maintenance display codes.

Note: Continually observe and look up codes and system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- BTU: QPC477
- CMA card: QPC581 or NTND10
- FN card: QPC579
- IF card: QPC580
- Data cartridge: QMM42
- FDI, MSI or EMSI card: QPC742, QPC584, NT9D34
- FDU or MDU: NT8D68 or NTND15, NT8D69 or NTND16
- Memory card: QPC583 or NTND09
- ROM card: QPC939 or NTND08
- SBE card: QPC215 (option 71)
- 3PE card: QPC441
- CPU/network or CPU card cage: NT6D3903, NT8D3403

Possible cause	Action
Defective module power supply	<p>Make sure the green LED on the CE power supply is lit. If it is not lit, go to "Clearing power faults" on page 19.</p> <p>If the power supply LED is lit, go to the next possible cause.</p>
Initialization required	<p>Press the manual initialize (Man Int) button on the IF card on the active CPU. If the system initializes, clear any faults indicated.</p> <p>If the system does not initialize, unseat network cards one at a time. If the system initializes, replace the last card you removed (it is faulty).</p> <p>If the system will not initialize, go to the next possible cause.</p>
Defective mass storage unit or interface card	<p>Unseat the mass storage unit and the interface card on the inactive CPU, then reinstall them. Make sure the cable between the interface card and the unit is securely connected. If the system does not recover, continue with this procedure.</p> <p>If a disabled interface card is indicated:</p> <ul style="list-style-type: none"> — Make sure the data cartridge is securely attached. — Check the switch settings; if necessary, correct the switch settings. — Try to enable the interface card (try to software disable, hardware disable, then reenable). — If you cannot load a program or the interface card is still disabled, replace it. — If necessary, replace the data cartridge. <p>If a disabled mass storage unit is indicated:</p> <ul style="list-style-type: none"> — Replace it. — If the unit is still disabled, replace the cable between the unit and the interface card. <p>If the system does not recover, go to the next possible cause.</p>
Sysload required	<p>Simultaneously press reload (Rld) button on both CMA cards.</p> <p>If a sysload (reload) occurs, clear any faults indicated.</p> <p>If the system will not sysload, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective CE card	<p>Unseat the CE cards, then reinstall them:</p> <ul style="list-style-type: none"> — Make sure all CE cables are securely connected, including the cable between the IF and FN cards. — Make sure the ROM card is properly installed on the FN card. <p>If the system does not recover, continue with this procedure. Try to sysload after any card is replaced.</p> <p>Check the inactive CPU by entering:</p> <p>LD 35 TCPU</p> <ul style="list-style-type: none"> — If a disabled card is indicated, check it with the appropriate test or stat command. — Try to software enable any disabled card (software disable, hardware disable, then reenable). <p>If the system does not recover:</p> <ul style="list-style-type: none"> — Unseat all CE cards (including SBE and 3PE cards) on the inactive CPU; try to sysload by pressing the reload button on the active CMA. — If a sysload occurs, reinsert the cards one at a time; the system will fail when the defective card is inserted; replace that card. <p>If the system does not sysload when all cards are reinstalled on the inactive CPU:</p> <ul style="list-style-type: none"> — Remove the cards from the other CPU and try to sysload. — Again, if a sysload occurs, reinsert the cards one at a time; replace the card that causes the failure. <p>If the system still does not sysload, one at a time, replace the CE cables until a sysload occurs.</p> <p>If the system does not recover, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:**Fault indicated on a memory card (options 61 and 71)**

The red LED is lit on a memory card. The dual CPU system will be operating but may be limited to one CPU. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CMA card: QPC581 or NTND10
- FN card: QPC579
- IF card: QPC580
- Memory card: QPC583 or NTND09
- ROM card: QPC939 or NTND08
- CPU/Network or CPU card cage: NT6D3903, NT8D3403

Possible cause	Action
Defective Memory card	<p>Check disabled memory by entering:</p> <p>LD 35 LDIS</p> <p>If the disabled memory card is on the active CPU, test CPUs by entering:</p> <p>TCPU</p> <p>If the response is "OK," switch CPUs by entering:</p> <p>SCPU</p> <p>Test the disabled Memory by entering:</p> <p>MEM x "x" represents the memory card number.</p> <p>If the memory card fails the test, replace it.</p> <p style="text-align: center;">(continued)</p>

Possible cause	Action
	<p>If the memory card passes the test, software disable it, then try to reenable by entering:</p> <p>ENL x</p> <p>If the card will not enable, replace it.</p> <p>If all memory cards are enabled but the CPU is still faulty, go to the next possible cause.</p>
Defective CMA	<p>Make sure the cable between the CMA cards is securely connected.</p> <p>Check the status of the CMA on the inactive CPU by entering:</p> <p>STAT CMA x "x" represents the CMA number.</p> <p>If the CMA is enabled, test CPUs by entering:</p> <p>TCPU</p> <p>If the response is "OK" switch CPUs by entering:</p> <p>SCPU</p> <p>If the CPU cannot switch but additional system messages do not indicate a CMA problem, go to the next possible cause.</p> <p>If the CMA is disabled or additional system messages indicate a CMA problem, try to enable the CMA by entering:</p> <p>ENL CMA x</p> <p>If the card will not enable, replace it.</p> <p>If the CMA is enabled but the CPU still will not switch, go to the next possible cause.</p>
Defective CE card	<p>Unseat the CE cards on the inactive CPU, then reinstall them:</p> <ul style="list-style-type: none"> — Make sure all CE cables are securely connected, including the cable between the IF and FN cards. — Make sure the ROM card is properly installed. <p>If the CPU is still faulty, continue with this procedure.</p>

(continued)

Possible cause	Action
	<p>Check the inactive CPU by entering:</p> <p>LD 35 TCPU</p> <ul style="list-style-type: none">— If a disabled card is indicated, check it with the appropriate test or stat command.— Try to software enable any disabled card (software disable, hardware disable, then reenable). <p>If the CPU is still faulty:</p> <ul style="list-style-type: none">— Unseat all CE cards on the inactive CPU; try to sysload by pressing the reload button on the active CMA.— If a sysload occurs, reinsert the cards one at a time; the system will fail when the defective card is inserted; replace that card. <p>If the CPU is still faulty, one at a time, replace the CE cables until a sysload occurs.</p> <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective backplane	Replace the card cage assembly in the module.

Symptom:

Fault indicated on a common equipment card (options 61 and 71)

The red LED is lit on a common equipment card, other than a memory card. The dual CPU system will still be operating but may be limited to one CPU. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Make sure the normal/maintenance switch on both QPC580 CPU Interface Cards is set to Norm. Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- BTU: QPC477
- CMA card: QPC581 or NTND10
- FN card: QPC579
- IF card: QPC580
- FDI, MSI, or EMSI card: QPC742, QPC584, NT9D34
- Memory card: QPC583 or NTND09
- ROM card: QPC939 or NTND08
- SBE card: QPC215 (option 71)
- SDI cards: NT8D41, QPC513, QPC841
- 3PE card: QPC441
- CPU/network or CPU card cage: NT6D3903, NT8D3403

Possible cause	Action
Defective FDI, MSI, or EMSI card (lit LED)	<p>Unseat the FDI, MSI, or EMSI card, then reinstall it. If the card does not recover, continue with this procedure.</p> <p>Make sure the cable between the mass storage unit and the interface card is securely connected.</p> <p>Check the card by entering:</p> <p>LD 37 MSI 0</p> <ul style="list-style-type: none">— If the card is disabled, try to enable it (software disable, hardware disable, then try to reenable).— If the card will not enable, check switch settings; if necessary, correct the switch settings and try to enable.— If the card will not enable, replace the card. <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective SDI	<p>Check each SDI port by entering:</p> <p>LD 37 STAT TTY</p> <ul style="list-style-type: none">— If software is disabled, try to enable it (software disable, hardware disable, then reenable).— If the card will not enable, replace it. <p>If the CPU is still faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective CE card (lit LED)	<p>Unseat the cards then reinstall them. Make sure all cables are securely connected. If all cards do not recover, continue with this procedure.</p> <p>If the LED is lit on the IF card:</p> <ul style="list-style-type: none"> — Make sure the cable between the IF and FN cards is securely connected. — Make sure the ROM card is properly installed on the FN card. — As necessary, replace the IF card, the FN card, the ROM card, and the QCAD240 cable between the IF and FN cards. <p>If the LED is lit on some other CE card, enter:</p> <p>LD 35</p> <p>and the appropriate test or stat command to check the status of the card:</p> <ul style="list-style-type: none"> — If a card is disabled, try to enable it (software disable, hardware disable, then try to reenable). — If the card will not enable, replace it. — If the card enables and the LED turns off, test the CPU by entering: <p>LD 35</p> <p>TCPU</p> <p>If the CPU is still faulty, replace the CE cards one at a time until the fault clears.</p> <p>If the CPU is still faulty, replace the CE cables one at a time.</p> <p>If the CPU remains faulty, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:**Fault indicated on a common equipment card
(options 51C, 61C, 81, and 81C)**

The red LED is lit or the display is indicating a fault on a common equipment card. The dual Core system will still be operating but may be limited to one CP. Option 51C with a single CPU may or may not process calls, depending on the problem. Look up system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given by these codes. If the fault does not clear, use this procedure.

Note: Make sure the normal/maintenance switch on both Call Processor cards is set to Norm for options 61C, 81, and 81C. Continually observe and look up system messages as you perform this procedure.

For information on switch settings for the applicable Core cards, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- CP card
- CP to CP cable: NTND11
- IODU/C card: NT5D61
- IOP/CMDU card: NT5D20
- IOP card: NT6D63
- CNI card: NT6D65
- 3PE card: QPC441
- Core backplane: NTND68 (option 81)
- CPNET backplane: NT9D1102 (options 51C and 61C)
- CPNET2 backplane: NT5D2102 (options 51C, 61C, and 81C)
- CBT card: NT6D6003
- Core or Core/Network card cage: NT6D6008, NT9D1101, or NT5D2101

Possible cause	Action
Defective serial I/O ports	<p>Check each SDI port by entering:</p> <p>LD 37 STAT TTY</p> <ul style="list-style-type: none">— If software is disabled, try to enable it (software disable, hardware disable, then try to reenable).— If the card will not enable, replace it. <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective IOP card	<p>Check the IOP card:</p> <ul style="list-style-type: none">— Reinstall the IOP card, test it, and enable it: <p>LD 137 DIS IOP TEST IOP ENL IOP ****</p> <p>If the CPU is still faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective CE card (lit LED)	<p>Unseat the CP and CNI cards, then reinstall them. Make sure all cables are securely connected. If all cards do not recover, continue with this procedure.</p> <p>If the display on the CP card shows a fault:</p> <p>LD 135</p> <p>TEST CPU</p> <p>If there is a problem with the test, CCED system messages will be generated.</p> <p>If the LED is lit on some other CE card, check the CNI card, enter:</p> <p>LD 135</p> <p>TEST CNI c s</p> <p>where c represents the CPU 0 or 1 and s represents the card slot.</p> <p>If the CPU is still faulty, replace the CE cables one at a time.</p> <p>If CNI is faulty, disable the card before you out it.</p> <p>If the CPU remains faulty, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p> <p>To be able to replace the card cage, you must first switch the system to use the alternate CPU and then disable and remove all the cards in the card cage you wish to replace.</p>

Symptom:

Floppy disk unit not operating

There may be a lit LED on the FDU. There may be a maintenance display code on the FDI card indicating a problem with the FDU. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Cable between FDU and FDI card
- Data cartridge: QMM42
- FDI card: QPC742
- FDU: NT8D68 or NTND15

Possible cause	Action
Defective FDI card or data cartridge	<p>Unseat the FDU and FDI card, then reinstall them. Make sure the cable between the FDU and FDI is securely connected. (In a dual CPU system, check both FDI cards.) If the FDU does not recover, continue with this procedure.</p> <p>Check the FDI:</p> <ul style="list-style-type: none">— Make sure the data cartridge is securely attached.— Check switch settings; if necessary, correct the switch settings.— Try to enable the FDI (try to software disable, hardware disable, then reenable).— If you cannot load a program or the FDI is still disabled, replace it.— If necessary, replace the data cartridge. <p>If the FDU is still not operating, go to the next possible cause.</p>
Defective FDU or cable	<p>Replace the FDU. If it is still disabled, replace the cable between the FDU and FDI.</p>

Symptom:

Multi Drive Unit or Small System Multi Drive Unit not operating

There may or may not be a lit LED on the front of the MDU. There may be a maintenance display code on the MSI or EMSI card indicating a problem with the MDU. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Cable between MDU and MSI or EMSI card
 - Data cartridge: QMM42
 - MSI or EMSI card: QPC584, NT9D34
 - MDU: NT8D69 or NTND16
 - SMDU: NT9D33
- CPU/network or CPU card cage: NT6D3903, NT8D3403

Possible cause	Action
Defective MDU (lit LED)	<p>Unseat the MDU and the MSI or EMSI card, then reinstall them. Make sure the cable between the MDU and MSI/EMSI is securely connected. (In a dual CPU system, check both MSI/EMSI cards.) If the MDU does not recover, continue with this procedure.</p> <p>Try to restore the hard drive from disks:</p> <ul style="list-style-type: none"> — Hardware disable the MSI/EMSI (in a dual CPU system, disable both MSI/EMSI cards), remove the card, and set SW4 to OFF. — Reinstall the MSI/EMSI card and hardware enable it. — Try to software enable the MSI/EMSI card through the Overlay Loader (you will not be in an overlay) by entering: **** ENLT <p>If you cannot load the program, try to enter LD 37 through the maintenance telephone:</p> <ul style="list-style-type: none"> — If you can load the program, test the port for the system terminal you were using. — If the port is okay, test the cable to the system terminal. — If the cable is okay, check the system terminal. <p>If you cannot load a program through the system terminal or the maintenance telephone, replace the MDU.</p> <p>If the MDU is still faulty, go to the next possible cause.</p>
Defective cable between MDU and MSI or EMSI card	<p>Replace the cable to each MSI or EMSI card.</p> <p>Try to test the MSI/EMSI and MDU by entering: LD 37 MSI x "x" represents the MSI/EMSI card number 0 or 1.</p> <p>If the MDU is still faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective MSI or EMSI card	<p>Check the MSI/EMSI card:</p> <ul style="list-style-type: none"> — Make sure the data cartridge is securely attached. — Check switch settings; if necessary, correct the switch settings. — Try to enable the MSI/EMSI card (try to software disable, hardware disable, then reenable). — If you cannot load a program or the MSI/EMSI is still disabled, replace it. — If the MSI/EMSI card is still disabled, replace the data cartridge. <p>If the MDU is still faulty, go to the next possible cause.</p>
Defective backplane connection to MDU (LED not lit)	<p>Move the MDU to another acceptable location.</p> <p>Try to test the MDU by entering:</p> <p>MSI x</p> <p>If the MDU is still faulty, replace it.</p> <p>If the MDU enables after it is moved, replace the card cage assembly in the module you took it from.</p>
Defective EMSI card or SMDU	<p>Unseat the SMDU and EMSI card then reinstall them. Make sure the cable between the SMDU and EMSI card is securely connected. If the system does not recover, continue with this procedure.</p> <p>If a disabled EMSI card is indicated:</p> <ul style="list-style-type: none"> — Make sure the data cartridge is securely attached. — Check the switch settings; if necessary, correct the switch settings. — Try to enable the EMSI card (try to software disable, hardware disable, then reenable). — If you cannot load a program or the EMSI is still disabled, replace it. — If necessary, replace the data cartridge. <p>If a disabled SMDU is indicated:</p> <ul style="list-style-type: none"> — Replace it. — If the SMDU is still disabled, replace the cable between the EMSI and SMDU card.

Symptom:

Core Multi Disk Unit not operating

There may or may not be a lit LED on the front of the CMDU. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- SCSI cable: NTND13
- IOP card: NT6D63
- CMDU:NT6D64
- Core or Core/Network card cage: NT6D6008, NT9D1101

Possible cause	Action
Defective CMDU (lit LED)	<p>Unseat the CMDU, then reinstall it. Make sure the cable between the CMDUs is securely connected. If the CMDU does not recover, continue with this procedure.</p> <p>Try to restore the hard drive from disks:</p> <ul style="list-style-type: none"> — Stat CMDU, enable it, and test it: <pre>LD 137 STAT CMDU x TEST CMDU x DIS CMDU X SYNC ENL CMDU X</pre> <p>If the problem continues, a CIOD system message appears and the LED lights on the faceplate.</p>

(continued)

Possible cause	Action
	<p>If you cannot load the program, replace the CMDU:</p> <ul style="list-style-type: none"> — If you can load the program, test the port for the system terminal you were using. — If the port is okay, test the cable to the system terminal. — If the cable is okay, check the system terminal. <p>If the CMDU is still faulty, go to the next possible cause.</p>
Defective SCSI cable between IOPs	<p>Replace the SCSI cable.</p> <p>Test IOP-to-IOP connection:</p> <p>LD 137 TEST SCSI</p> <p>If the CMDU is still faulty, go to the next possible cause.</p>
Defective IOP card	<p>Check the IOP card:</p> <ul style="list-style-type: none"> — Reinstall the IOP card, test it, and enable it: <p>LD 137 DIS IOP TEST IOP ENL IOP</p> <p>If the CMDU is still faulty, go to the next possible cause.</p>
Defective backplane connection to CMDU (LED not lit)	<p>Move the CMDU to another acceptable location.</p> <p>Try to test the CMDU by entering:</p> <p>LD 137 TEST CMDU x "x" represents the CMDU card number 0 or 1</p> <p>If the CMDU is still faulty, replace it.</p> <p>If the CMDU enables after it is moved, replace the card cage assembly in the module you took it from.</p>

Symptom: IOP/CMDU not operating

There may or may not be a lit LED on the front of the IOP/CMDU. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- IOP/CMDU:NT5D20
- Core/Network card cage: NT5D2101

Possible cause	Action
Defective IOP/CMDU (lit LED)	<p>Unseat the IOP/CMDU, then reinstall it. If the IOP/CMDU does not recover, continue with this procedure.</p> <p>Try to restore the hard drive from disks:</p> <ul style="list-style-type: none"> — Stat IOP/CMDU, enable it, and test it: <pre>LD 137 STAT CMDU x TEST CMDU x DIS CMDU X SYNC ENL CMDU X</pre> <p>If the problem continues, a CIOD system message appears and the LED lights on the faceplate.</p>

(continued)

Possible cause	Action
	<p>If you cannot load the program, replace the IOP/CMDU:</p> <ul style="list-style-type: none"> — If you can load the program, test the port for the system terminal you were using. — If the port is okay, test the cable to the system terminal. — If the cable is okay, check the system terminal. <p>If the CMDU is still faulty, go to the next possible cause.</p>
Defective IOP card	<p>Check the IOP card:</p> <ul style="list-style-type: none"> — Reinstall the IOP card, test it, and enable it: <p>LD 137 DIS IOP TEST IOP ENL IOP</p> <p>If the IOP/CMDU is still faulty, go to the next possible cause.</p>
Defective backplane connection to IOP/CMDU (LED not lit)	<p>Try to test the IOP/CMDU by entering:</p> <p>LD 137 TEST CMDU x "x" represents the IOP/CMDU card number 0 or 1</p> <p>If the CMDU is still faulty, replace it.</p> <p>If the CMDU enables after it is moved, replace the card cage assembly in the module you took it from.</p>

Symptom: IODU/C not operating

There may or may not be a lit LED on the front of the IODU/C. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform this procedure.

For more information on IODU/C, please see the *IODU/C Reference Guide*. For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- IODU/C: NT5D61
- Core/Network card cage: NT5D2101

Possible cause	Action
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Defective IODU/C (lit LED)	<p>Unseat the IODU/C, then reinstall it. If the IODU/C does not recover, continue with this procedure.</p> <p>Try to restore the hard drive from disks:</p> <ul style="list-style-type: none"> — Stat, enable, and test the CMDU part of the IODU/C card: <p>LD 137 STAT CMDU x TEST CMDU x DIS CMDU X SYNC ENL CMDU X</p> <p>If the problem continues, a CIOD system message appears and the LED lights on the faceplate.</p> <p style="text-align: center;">(continued)</p>
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Possible cause	Action
	<p>If you cannot load the program, replace the IODU/C:</p> <ul style="list-style-type: none"> — If you can load the program, test the port for the system terminal you were using. — If the port is okay, test the cable to the system terminal. — If the cable is okay, check the system terminal. <p>If the CMDU part of the IODU/C is still faulty, go to the next possible cause.</p>
Defective IOP part of the IODU/C card	<p>Check the IOP part of the IODU/C card:</p> <ul style="list-style-type: none"> — Reinstall the IODU/C card; test and enable the IOP part of the IODU/C card. <p>LD 137 DIS IOP TEST IOP ENL IOP</p> <p>If the IODU/C is still faulty, go to the next possible cause.</p>
Defective backplane connection to IODU/C (LED not lit)	<p>Try to test the IODU/C by entering:</p> <p>LD 137 TEST CMDU x "x" represents the IODU/C card number 0 or 1</p> <p>If the CMDU part of the IODU/C card is still faulty, replace the IODU/C card.</p> <p>If the CMDU part of the IODU/C enables after it is moved, replace the card cage assembly in the module you took it from.</p>
CD-ROM drive not operating	<p>For redundant systems, remove the disk from the CD-ROM drive, place it in the CD-ROM drive of the other Core, and test operation.</p> <p>If the CD-ROM drive is operational you may need to replace the IODU/C card with the faulty CD-ROM drive.</p>

Possible cause	Action
CD disk is damaged	<p>If you have another CD-ROM disk, insert that CD-ROM disk into a known operational IODU/C card, and load the Software Installation Tool from the correct Install Program diskette.</p> <p>In the Software Installation Tool, go to the Tools Menu and select option <j> - "To check the customer-specific part of the CD-ROM." If this test is successful, the message "Checking directory /cdx/xxxx_DMR.Nxx ended successfully" is displayed.x</p> <p>If the test is successful, it is unlikely the CD-ROM disk is damaged.</p> <p>However, if the test indicates a failure to read all files on the CD-ROM disk, then the CD-ROM disk is damaged and should be replaced.</p>
Mismatch between the Security Device and keycode.	<p>Positively identify the NT SDID (8 digits engraved on the face of the Security Device beneath the Nortel logo) with the NT SDID contained on the keycode floppy disk label, and verify the NT SDIDs match.</p>
IODU/C Software Installation Tool does not load	<p>Verify that the correct Install Program diskette is being used for the CP card in your system.</p>

Clearing network equipment faults

Symptoms:

Disabled loop indicated by OVD message (NT1P61 Fibre Superloop Network Card)	97
Disabled loop indicated by OVD message (NT7R51 Local Carrier Interface Card)	99
Disabled loop indicated by OVD message (NT8D04 Superloop Network Card)	101
Loop disabled without OVD message (NT8D04 Superloop Network Card)	103
Disabled loop indicated by OVD message (QPC414 Network Card) .	105
Loop disabled without OVD message (QPC414 Network Card)	108
Disabled peripheral signaling card indicated by OVD message	111
Peripheral signaling card disabled without OVD message	113
Problems with transferring, placing conference calls, or Music-on-Hold	115
Problems placing calls on 2500 telephones and some trunks	117

Network equipment faults

Network equipment in the Meridian 1 provides speech path switching and transmits and receives signaling messages from the CPU. Network equipment can include:

- conference/tone and digit switch (CONF/TDS) card: provides conference capability, all tones for the system, and multifrequency sender (MFS) functionality
- intergroup switch (IGS) card: provides speech path switching between network groups for options 71, 81, and 81C
- network card: provides digital switching for the system

Note 1: The NT8D04 Superloop Network Card provides the equivalent of four network loops. The NT1P61 Fibre Superloop Network card and the NT7R51 Local Carrier Interface card provide the equivalent of two network loops.

Note 2: The NT8D18 Network/Digitone Receiver (DTR) Card provides the digital switching and MFS functionality, for options 21A, 21, and 21E.

- peripheral signaling (PS) card: provides the signaling interface to the CPU and clocking

Note: The NT8D19 Memory/Peripheral Signaling Card combines the functionality of memory and peripheral signaling cards, as well as miscellaneous CPU functions, for options 21A and 21. The NTND02 Misc/SDI/Peripheral Signaling Card combines the functionality of peripheral signaling and SDI cards, as well as miscellaneous CPU functions.

- serial data interface (SDI) card: provides the interface from the CPU to an input/output (I/O) device

Network equipment faults can cause system initializations and disable conference capability or all terminal connections (such as trunks and telephones) on a loop. Defective network equipment can make functional peripheral equipment seem faulty.

Fault clearing procedures

Manual continuity tests can be used to isolate superloop network card and IPE faults. For a description of manual continuity tests, see *Meridian 1 general maintenance information* (553-3001-500). See “LD 45” in the *X11 input/output guide* for details on performing the tests.

Table 10 lists common network equipment fault indications. To clear faults, select the symptom that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: Clear any power or common equipment faults before you try to clear network equipment faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “Clearing network equipment faults” on page 93 to see if another type of fault is indicated.

After the fault is corrected, go to “Final maintenance procedure” on page 177 to completely restore normal operation.

WARNING

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Table 10
Network equipment fault indicators

Indicator	Possible indications
System messages	BSD081, 101, 110, 111, 121, 130, 201–203, 205–209, 600, 602 CNF messages DTA, DTC, DTI messages ERR020, 120, 4060 INI003, 007–012 NWS101, 141, 201–204, 301, 401 OVD021, 022, 023, 031 TDS messages XMI messages
Visual indicators	Minor alarm on an attendant console Red LEDs lit or flashing on cards
User reports	Minor alarm reported by attendant Users cannot transfer or conference Users cannot dial out on 500/2500 telephones No dial tone at all sets; no display on digital sets

Symptom:**Disabled loop indicated by OVD message
(NT1P61 Fibre Superloop Network Card)**

An overload (OVD) system message indicates that a loop on an NT1P61 Fibre Superloop Network Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit or flashing. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate superloop network card and IPE faults. See “LD 45” in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Fibre Peripheral Controller card: NT1P62
- Fibre Superloop network card: NT1P61
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective superloop network card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test or executing the XNTT loop command. If the test fails, check the card status.</p> <p>Check the status of the Fibre Superloop Network card:</p> <p>LD 30 STAT loop “loop” represents the loop number.</p> <p>Check the display and take steps to resolve the problem indicated is the status report.</p>

(continued)

Possible cause	Action
	<p>If you receive an OVD message, replace the superloop network card.</p> <p>If the card is disabled, enable it by executing the ENLL loop command. If the response is UNEQ, install the card correctly and observe self-test.</p>
Defective controller card	<p>Perform the Fibre Peripheral Controller card self-test:</p> <p>DSXP x "x" represents the controller number.</p> <p>If the test passed, enable the card by executing:</p> <p>ENXP x "x" represents the controller number.</p> <p>If the test failed, check the maintenance display codes on the controller card and wait for an OVD message. In the OVD message is received, replace the card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective PE card	<p>Reinsert the PE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenale it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the PE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>
Defective fibre-optic span	<p>To check the fibre-optic span, perform loopback test across the span.</p> <p>Load LD 45 and execute the XCON 6 test with Fibre Superloop Network card as the generator and detector with span looped at the Fibre Peripheral Controller card at the Fibre Remote IPE.</p> <p>Check the test results and proceed accordingly.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 145) to fix the fault.</p>

Symptom:

Disabled loop indicated by OVD message (NT7R51 Local Carrier Interface Card)

An overload (OVD) system message indicates that a loop on an NT7R51 Local Carrier Interface Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit or flashing. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate superloop network card and IPE faults. See “LD 45” in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Remote Carrier Interface card: NT7R52
- Local Carrier Interface card: NT7R51
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective Local Carrier Interface card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Check the status of the Local Carrier Interface card:</p> <p>LD 32 STAT sl “sl” represents the loop number.</p> <p>Check the display and take steps to resolve the problem indicated is the status report.</p>

(continued)

Possible cause	Action
	<p>If you receive an OVD message, replace the superloop network card.</p> <p>If the card is disabled, enable it by executing the ENLL sl command. If the response is UNEQ, install the card correctly and observe self-test.</p>
Defective Remote Carrier Interface card	<p>Unseat all cards on the PE shelf except the Remote Carrier Interface card. Unseat and seat the Remote Carrier Interface card to start self-test. Observe self-test:</p> <p>If the test passed, enable the card by executing:</p> <p>ENXP x "x" represents the controller number.</p> <p>If the test failed, check the maintenance display codes on the card faceplate and wait for an OVD message. In the OVD message is received, replace the card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective PE card	<p>Reinsert the PE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenale it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the PE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>
Defective cable	<p>To check the carrier span, perform loopback test across the span.</p> <p>Load LD 45 and execute the XCON 6 test with Local Carrier Interface card as the generator and detector with span looped at the Remote Carrier Interface card at the Carrier Remote IPE.</p> <p>Check the test results and proceed accordingly.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 145) to fix the fault.</p>

Symptom:**Disabled loop indicated by OVD message
(NT8D04 Superloop Network Card)**

An overload (OVD) system message indicates that a loop on an NT8D04 Superloop Network Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit or flashing. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate superloop network card and IPE faults. See “LD 45” in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Controller card: NT8D01
- Superloop network card: NT8D04
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective superloop network card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Disconnect the loop cable(s) to the superloop network card. Enable and test each loop on the card by entering:</p> <p>LD 32 ENLL loop “loop” represents the loop number.</p> <p>Wait for an OVD message.</p>

(continued)

Possible cause	Action
	<p>If you receive an OVD message, replace the superloop network card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective controller card	<p>Unseat all cards on the PE shelf except the controller card. Reconnect the loop cable to the controller card and enable the card by entering:</p> <p>ENXP x "x" represents the controller number.</p> <p>Note: If more than one shelf is involved, follow this and subsequent procedures one at a time for each controller card.</p> <p>Check the maintenance display codes on the controller card and wait for an OVD message.</p> <p>If you receive an OVD message, unseat and reinstall the controller card to initiate a self-test. If the test fails, replace the card and reinsert cards on the PE shelf.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective PE card	<p>Reinsert the PE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenale it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the PE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>
Defective cable	<p>Disconnect the loop cable at the controller card. (If there is more than one loop cables, disconnect them one at a time and follow the procedure below for each cable.)</p> <p>Reconnect the cable(s) to the superloop network card and wait for an OVD message.</p> <p>If you receive an OVD message, replace the cable.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 145) to fix the fault.</p>

Symptom:**Loop disabled without OVD message
(NT8D04 Superloop Network Card)**

There is probably a system message indicating the loop or loops on this card are defective or disabled, but there is no overload (OVD) message indicating the card is disabled. The LED on the faceplate may be lit or flashing. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate superloop network card and IPE faults. See "LD 45" in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Controller card: NT8D01
- Superloop network card: NT8D04
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective superloop network card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Disconnect the loop cable(s) to the superloop network card. Try to enable each loop on the card by entering:</p> <p>LD 30 ENLL loop "loop" represents the loop number.</p> <p>Test each loop by entering:</p> <p>LOOP loop</p>

(continued)

Possible cause	Action
	<p>If you receive an OVD message at this point, replace the superloop network card.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective controller card	<p>Unseat all cards on the PE shelf except the controller card. Reconnect the loop cable to the controller card and enable the controller card by entering:</p> <p>LD 32 ENXP x "x" represents the controller number.</p> <p>Note: If more than one shelf is involved, follow this and subsequent procedures one at a time for each controller card.</p> <p>Check the maintenance display codes on the controller card.</p> <p>If you receive an OVD message at this point, unseat and reinstall the controller card to initiate a self-test. If the test fails, replace the card. Reinsert cards on the PE shelf.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective PE card	<p>Reinsert the PE cards one at a time.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenale it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the PE cards is inserted, replace that card.</p> <p>If no LEDs light and there is no OVD message as you reinsert the cards, go to the next possible cause.</p>
Defective cable	<p>Disconnect the loop cable at the controller card. (If there is more than one cable, disconnect them one at a time and follow the procedure below for each cable.)</p> <p>Reconnect the cable(s) to the superloop network card.</p> <p>If you receive an OVD message at this point replace the cable.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 145) to fix the fault.</p>

Symptom:**Disabled loop indicated by OVD message
(QPC414 Network Card)**

An overload (OVD) system message indicates that a loop on a QPC414 Network Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Dual loop peripheral buffer (DLB) card: QPC659
- NT5K10 DLB card used in the NT5K11 EEPE module
- Network card: QPC414
- PE card
- Cable between network card and DLB card

Possible cause	Action
Defective network card	<p>Disconnect the loop cable(s) to the network card. Enable and test each loop on the network card by entering:</p> <p>LD 30 ENLL loop “loop” represents the loop number.</p> <p>Test each loop by entering:</p> <p>LOOP loop</p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message, replace the network card.</p> <p>If there is no OVD message, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective DLB card	<p>Unseat all cards on the PE shelf except the DLB card (if there are two shelves on the loop, disconnect the cable to connector LPY):</p> <ul style="list-style-type: none"> — Reconnect the loop cable to the DLB card. — If you receive an OVD message, replace the DLB card and reinsert cards on the PE shelf. <p>If there is no OVD message:</p> <ul style="list-style-type: none"> — Check switch settings on the DLB card; if necessary, correct the switch settings. — If there are two shelves on the loop, go to the next possible cause. — If there is one shelf on the loop, go to "Disabled peripheral equipment card" on page 130
Defective DLB card on second shelf (if two shelves are on the loop)	<p>Unseat all cards on the second shelf except the DLB card. Reconnect the inter-shelf cable to the DLB card and wait for an OVD message.</p> <p>If there is an OVD message, replace the DLB card and reinsert cards on the PE shelf.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective NT5K10 DLB card	<p>In Dual Loop Mode</p> <ul style="list-style-type: none"> — Unseat 4 PE cards pertaining to the defective loop or <p>In Single Loop Mode</p> <ul style="list-style-type: none"> — Unseat 8 PE cards pertaining to the defective loop. <p>Wait for the OVD message.</p> <p>If there is no OVD message, go to the defective PE card.</p> <p>If you receive an OVD message, remove the backplane access plate at the back of the EEPE shelf and replace the Dual Loop Peripheral Buffer Card.</p> <p>Reinsert the PE cards on the shelf.</p> <p>Replace the backplane access plate.</p>

(continued)

Possible cause	Action
Defective PE card	<p>Reinsert the PE cards one at a time. (If there are two shelves on the loop, follow this and subsequent procedures one at a time for each shelf.) Wait for an OVD message after each card is inserted.</p> <p>If the LED lights when a card is inserted, software disable the card, then try to reenable it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the PE cards is inserted, replace that card.</p> <p>If there is no OVD message as you reinsert the cards, go to the next possible cause.</p>
Defective cable between network and DLB cards	<p>For the EEPE shelf only: remove the backplane access plate at the back of the module.</p> <p>Disconnect the loop cable at the DLB card.</p> <p>Reconnect the cable(s) to the network card and wait for an OVD message.</p> <p>If you receive an OVD message, replace the cable.</p> <p>If there is no OVD message, go to the next possible cause.</p> <p>For the EEPE shelf only: replace the backplane access plate.</p>
Defective cable between shelves (if two shelves are on the loop)	<p>Disconnect the inter-shelf cable to connector LPX on the second shelf DLB card.</p> <p>Reconnect the cable to connector LPY on the first shelf DLB card and wait for an OVD message.</p> <p>If you receive an OVD message, replace the inter-shelf cable. Reinsert cards on the PE shelf.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 145) to fix the fault.</p>

Symptom:

Loop disabled without OVD message (QPC414 Network Card)

There is probably a system message indicating that the loop or loops on this card are defective or disabled, but there is no overload (OVD) message indicating the card is disabled. The LED on the faceplate may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Dual loop peripheral buffer (DLB) card: QPC659
- NT5K10 DLB card used in the NT5K11 EEPE module
- Network card: QPC414
- PE card
- Cable between network card and DLB card

Possible cause	Action
Defective network card	<p>Test the loops on the card by entering:</p> <p>LD 30 LOOP loop "loop" represents the loop number.</p> <p>Try to enable the loops by entering:</p> <p>ENLL loop</p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message at this point, replace the network card.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective DLB card	<p>Unseat all cards on the PE shelf except the DLB card (if there are two shelves on the loop, disconnect the cable to connector LPY):</p> <ul style="list-style-type: none"> — Reconnect the loop cable to the DLB card. — If you receive an OVD message at this point, replace the peripheral buffer card and reinsert cards on the PE shelf. <p>If there is no OVD message and the loops will not enable:</p> <ul style="list-style-type: none"> — Check switch settings on the DLB card; if necessary, correct the switch settings. — If there are two shelves on the loop, go to the next possible cause. — If there is one shelf on the loop, go to "Disabled peripheral equipment card" on page 130.
Defective QPC659 DLB card on second shelf (if two shelves are on the loop)	<p>Unseat all cards on the second shelf except the DLB card. Reconnect the inter-shelf cable to the DLB card.</p> <p>If you receive an OVD message at this point, replace the DLB card and reinsert cards on the PE shelf.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective NT5K10 Peripheral Buffer Card	<p>In Dual Loop Mode</p> <ul style="list-style-type: none"> — Unseat 4 PE cards pertaining to the defective loop or <p>In Single Loop Mode</p> <ul style="list-style-type: none"> — Unseat 8 PE cards pertaining to the defective loop. <p>Wait for the OVD message.</p> <p>If there is no OVD message, go to the defective PE card.</p> <p>If you receive an OVD message, remove the backplane access plate at the back of the EEPE shelf and replace the Dual Loop Peripheral Buffer Card.</p> <p>Reinsert the PE cards on the shelf.</p> <p>Replace the backplane access plate.</p>

(continued)

Possible cause	Action
Defective PE card	<p>Reinsert the PE cards one at a time. (If there are two shelves on the loop, follow this and subsequent procedures one at a time for each shelf.)</p> <p>If the LED lights when a card is inserted, software disable the card, then try to reenable it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the PE cards is inserted, replace that card.</p> <p>If no LEDs light and there is no OVD message as you reinsert the cards, go to the next possible cause.</p>
Defective cable between network and DLB cards	<p>For EEPE shelf only: remove the backplane access plate at the rear of the module.</p> <p>Disconnect the loop cable at the DLB card.</p> <p>Reconnect the cable(s) to the network card.</p> <p>If you receive an OVD message at this point, replace the cable.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p> <p>For EEPE shelf only: remove the backplane access plate at the rear of the module.</p>
Defective cable between shelves (if two shelves on the loop)	<p>Disconnect the inter-shelf cable to connector LPX on the second shelf DLB card.</p> <p>Reconnect the cable to connector LPY on the first shelf DLB card.</p> <p>If you receive an OVD message at this point, replace the inter-shelf cable. Reinsert cards on the PE shelf.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 145) to fix the fault.</p>

Symptom:

Disabled peripheral signaling card indicated by OVD message

There is an overload (OVD) system message indicating that a peripheral signaling card is disabled. The LED on the faceplate may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Superloop network card or network card: NT8D04, QPC414
- PS card: QPC43
- Clock controller: QPC471, QPC775
- D-channel handler interface card: QPC757

Possible cause	Action
Defective PS card	<p>Unseat all network cards associated with the PS card.</p> <p>Enable the PS card by entering:</p> <p>LD 32 ENPS x "x" represents the PS card number.</p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message, replace the PS card.</p> <p>If there is no OVD message, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective network card	<p>Reinsert network cards one at a time.</p> <p>Wait for an OVD message after each card is inserted.</p> <p>If you receive an OVD message when one of the cards is inserted, replace that card.</p> <p>Reenable the PS card by entering:</p> <p>LD 32 ENPS x</p> <p>If you do not receive an OVD message, go to the next possible cause.</p>
Defective clock controller	<p>See <i>Digital Trunk Interface/Computer-to-PBX Interface maintenance</i> (553-2811-500)</p>

Symptom:**Peripheral signaling card disabled without OVD message**

The peripheral signaling card is disabled on one shelf. The LED on its faceplate may be lit. There is no overload (OVD) message indicating a fault with this card. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Superloop network card or network card: NT8D04, QPC414
- PS card: QPC43
- Clock controller: QPC471, QPC775
- D-channel handler interface card: QPC757

Possible cause	Action
Defective PS card	<p>Unseat all network cards associated with the PS card.</p> <p>Try to enable the PS card by entering:</p> <p>LD 32 ENPS x "x" represents the PS card number.</p> <p>If you receive an OVD message at this point or you cannot enable the PS card, replace it.</p> <p>If the PS card is still disabled, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective network card	<p>Reinsert network cards one at a time.</p> <p>If you receive an OVD message when one of the cards is inserted or if the card is disabled, replace that card.</p> <p>Reenable the PS card by entering:</p> <p>LD 32 ENPS x</p> <p>If the PS card is still disabled, go to the next possible cause.</p>
Defective clock controller	<p>See <i>Digital Trunk Interface/Computer-to-PBX Interface maintenance</i> (553-2811-500)</p>

Symptom:**Problems with transferring, placing conference calls, or Music-on-Hold**

Several users cannot transfer or place conference calls, or calls do not receive Music-on-Hold. A card that provides conference capability may be disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Conference/TDS card: NT8D17
- PS card: QPC43
- 3PE card: QPC441
- Telephone keys

Possible cause	Action
Defective conference/TDS card	<p>If there are no messages indicating a fault on any conference loop, test each conference loop in the system by entering:</p> <p>LD 38 CNFC loop “loop” represents the conference loop number.</p> <p>Note: See the <i>X11 input/output guide</i> for other tests.</p> <p>If the conference loop is disabled, try to enable it by entering:</p> <p>LD 38 ENLX loop “loop” represents the Conference loop, which is the odd loop of the Conference/TDS loop pair.</p> <p>Note: You must enable the card with the command ENLX. Enabling the loops with the command ENLL does not enable the hardware.</p>

(continued)

Possible cause	Action
	<p>If a fault is indicated on a conference loop, replace the conference/TDS card identified.</p> <p>If no faults are detected on any conference loop, go to the next possible cause.</p>
Defective card on Network shelf	<p>One at a time, replace the following cards until the fault clears:</p> <ul style="list-style-type: none"> — 3PE card — PS card <p>If there is still a Conference problem, go to the next possible cause.</p>
Defective telephone keys	<p>Check the keys on any telephone with this problem. See the following Northern Telecom Publications:</p> <ul style="list-style-type: none"> — <i>X11 input/output guide—LD31 tests</i> — <i>Telephone and attendant console installation (553-3001-215)</i> — <i>Meridian 1 telephones description and specifications (553-3001-108)</i>
Excessive traffic in the system	<p>Additional conference/TDS cards may be required to handle the traffic in the system. See <i>Traffic measurement formats and output (553-2001-450)</i>.</p>

Symptom:**Problems placing calls on 2500 telephones and some trunks**

Several users of 2500 telephones report trouble placing calls. Other users may report trouble dialing on certain trunks. A digitone receiver or a card that provides tone and digit switch capability may be disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Tone Detector Card: NT5K20, NT5K48
- Conference/TDS card: NT8D17
- DTR card: NT8D16
- Network/DTR card: NT8D18

Possible cause	Action
Defective digitone receiver	<p>Check for disabled digitone receiver TNs by entering:</p> <p>LD 34 STAT</p> <p>If any are disabled, try to enable them by entering:</p> <p>ENLR l s c u "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Test the digitone receiver by entering:</p> <p>DTR l s c u</p> <p>If the digitone receiver fails the test, replace it.</p> <p>If the digitone receiver passes the test, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective conference/TDS card	<p>Test Tone and Digit Switch loops by entering:</p> <p>LD 34</p> <p>TDS loop "loop" represents the loop number.</p> <p>If the conference loop is disabled, try to enable it by entering:</p> <p>ENLX loop "loop" represents the TDS/MFS loop, which is the even loop of the Conference/TDS loop pair).</p> <p>Note: You must enable the card with the command ENLX. Enabling the loops with the command ENLL does not enable the hardware.</p> <p>If a fault is indicated on a conference loop, replace the conference/TDS card identified.</p> <p>If no faults are detected on any conference loop, go to the next possible cause.</p>
Excessive traffic in the system	<p>Additional digitone receivers or conference/TDS cards may be required to handle the traffic in the system. See <i>Traffic measurement formats and output</i> (553-2001-450).</p>

Clearing peripheral equipment faults

Symptoms:

Red LED lit on Fibre Peripheral Controller card	122
Red LED lit on Remote Carrier Interface card	124
Red LED lit on Peripheral Controller card	126
Red LED lit on dual loop peripheral buffer card	128
Disabled peripheral equipment card	130
More than one peripheral equipment card disabled	132

Peripheral equipment faults

Peripheral equipment (PE) provides the interface between network equipment switching and terminal equipment (such as trunks, telephones, data sets, and attendant consoles). Peripheral equipment faults can disable network and terminal equipment.

Note: For fault clearing purposes, the general term “peripheral equipment” includes intelligent peripheral equipment (IPE). When there are differences, PE and IPE are specified.

CAUTION

NT6D71 fuse replacement F1 through F16.

For continued protection against risk of fire, replace the fuse only with a fuse of the same type and rating (125 V, 1.0 A).

Fault clearing procedures

Manual continuity tests can be used to isolate superloop network card and IPE faults. For a description of manual continuity tests, see *Meridian 1 general maintenance information* (553-3001-500). See “LD45” in the *X11 system messages guide* for details on performing the tests.

Table 11 lists common peripheral equipment fault indications (many other system messages may be generated). To clear faults, select the symptom that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: Clear any power or common equipment faults before you try to clear telephone faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 3 to see if another type of fault is indicated.

After the fault is corrected, go to “Final maintenance procedure” on page 177 to completely restore normal operation.

Table 11
Peripheral equipment fault indicators

Indicator	Possible indications
Sample system messages	BSD301, 401, 402 ERR4062 NWS301, 401, 501 OVD001–010, 024 XMI messages
Visual indicators	Red LEDs lit on cards
Maintenance displays	NT8D01BC, NT8D01AC, or NT8D01AD Controller Card
User reports	Trouble with calls on attendant console Trouble with calls on 500/2500 telephones Trouble with calls on SL-1, M1000, or digital telephones

WARNING

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Symptom:

Red LED lit on Fibre Peripheral Controller card

The red LED is lit on the controller card. Red LEDs on Peripheral (PE) Equipment cards on the same shelf may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate IPE faults. See “LD45” in the *X11 input/output guide* for details on performing loopback tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Fibre Peripheral Controller card: NT1P62
- IPE card
- IPE card cage: NT8D3703

Possible cause	Action
Defective fibre peripheral controller card	<p>Perform the fibre controller card self-test by executing the DSXP x command for LD 32 to disable the card.</p> <p>Execute the XPCT x command to initiate self-test.</p> <ul style="list-style-type: none"> — The maintenance display on the card shows the code for each test running (see “HEX” in the <i>X11 input/output guide</i>). — If the tests complete successfully, the display continuously flashes. — If the card continually fails a test, the code for that test is steadily displayed. <p>If the test fails, replace the card.</p> <p>If the test passes but the card is still disabled, enable the card:</p> <p>ENXP x “x” represents the controller number.</p> <p>If the test fails, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective PE card	<p>Unseat all the cards in the shelf associated with the controller card:</p> <ul style="list-style-type: none">— If the red LED on the controller card turns off, the fault is in one of the unseated cards.— Reinsert the cards one at a time.— When the controller card LED turns on again, replace the last card you inserted. <p>If the red LED on the controller card does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p>
Defective cable	<p>Test all cables to the controller card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Red LED lit on Remote Carrier Interface card

The red LED is lit on only one controller card. Red LEDs on Peripheral (PE) Equipment cards on the same shelf may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate IPE faults. See "LD45" in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Remote Carrier Interface card: NT7R52
- IPE card
- IPE card cage: NT8D3703

Possible cause	Action
Defective Remote Carrier Interface card	<p>Perform the remote carrier interface card self-test by removing and reinstalling the card.</p> <p>Observe the self-test:</p> <ul style="list-style-type: none"> — The maintenance display on the card shows the code for each test running (see "HEX" in the <i>X11 input/output guide</i>). — If the tests complete successfully, the display continuously flashes. — If the card continually fails a test, the code for that test is steadily displayed. <p>If the test fails, replace the card.</p> <p>If the test passes but the card is still disabled, enable the card:</p> <p>ENLL sl "sl" represents the card number.</p> <p>If the test fails, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective PE card	<p>Unseat all the cards in the shelf associated with the controller card:</p> <ul style="list-style-type: none">— If the red LED on the controller card turns off, the fault is in one of the unseated cards.— Reinsert the cards one at a time.— When the controller card LED turns on again, replace the last card you inserted. <p>If the red LED on the controller card does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p>
Defective cable	<p>Test all cables to the controller card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom: Red LED lit on Peripheral Controller card

The red LED is lit on only one controller card. Red LEDs on Peripheral (PE) Equipment cards on the same shelf may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate IPE faults. See "LD45" in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Controller card: NT8D01BC, NT8D01AC, NT8D01AD
- IPE card
- IPE card cage: NT8D3703

Possible cause	Action
Defective controller card	<p>Remove, then, reinstall the controller card to initiate a self-test:</p> <ul style="list-style-type: none">— The maintenance display on the card shows the code for each test running (see "HEX" in the <i>X11 input/output guide</i>).— If the tests complete successfully, the display continuously flashes.— If the card continually fails a test, the code for that test is steadily displayed. <p>If the test fails, replace the card.</p> <p>If the test passes but the card is still disabled, test the loop by entering:</p> <p>LD 30 LOOP loop "loop" represents the loop number.</p> <p>If the test fails, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective PE card	<p>Unseat all the cards in the shelf associated with the controller card:</p> <ul style="list-style-type: none">— If the red LED on the controller card turns off, the fault is in one of the unseated cards.— Reinsert the cards one at a time.— When the controller card LED turns on again, replace the last card you inserted. <p>If the red LED on the controller card does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p>
Defective cable	<p>Test all cables to the controller card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Red LED lit on dual loop peripheral buffer card

The red LED is lit on only one dual loop peripheral buffer card. Red LEDs on PE cards on the same shelf may be lit. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

For information on switch settings, see *Circuit card installation and testing* (553-3001-211). Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Dual loop peripheral buffer (DLB) card: QPC659 or NT5K10
- Existing Peripheral Equipment Power Supply (EPEPS): NT5K12
- Cable between the Network Superloop card and the Enhanced Dual Loop Peripheral Buffer Card
- PE card
- PE card cage NT8D1303 or NT5K1106

Possible cause	Action
Defective QPC659M DLB card	<p>Test the shelf by entering:</p> <p>LD 30 LOOP I s "I s" represents loop and shelf numbers.</p> <p>Note: If two loops are assigned to the shelf, be sure to test both.</p> <p>If a defective DLB card is indicated, check the switch settings on the card. If the switch settings are correct, replace the card.</p> <p>If the test fails but the DLB card does not seem to be faulty, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective NT5K10 DLB card	<p>In Dual Loop Mode</p> <ul style="list-style-type: none">— Unseat 4 PE cards pertaining to the defective loop or <p>In Single Loop Mode</p> <ul style="list-style-type: none">— Unseat 8 PE cards pertaining to the defective loop. <p>Wait for the OVD message.</p> <p>If there is no OVD message, go to the defective PE card.</p> <p>If you receive an OVD message, remove the backplane access plate at the rear of the EEPE shelf and replace the Dual Loop Peripheral Buffer Card.</p> <p>Reinsert the PE cards on the shelf.</p> <p>Replace the backplane access plate.</p>
Defective PE card	<p>For the EEPE shelf only: remove the backplane access plate at the rear of the module.</p> <p>Unseat all the cards in the shelf associated with the DLB card:</p> <ul style="list-style-type: none">— If the red LED on the DLB card turns off, the fault is in one of the unseated cards.— Reinsert the cards one at a time.— When the DLB LED turns on again, replace the last card you inserted. <p>If the red LED on the DLB does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p> <p>For the EEPE shelf only: replace the backplane access plate at the rear of the module.</p>
Defective cable	<p>Test all cables to the DLB card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

Symptom:

Disabled peripheral equipment card

One PE or IPE card is disabled, the red LED on a PE card is lit, or two or more units on a card are disabled. There is a system message indicating that the card or units on the card are disabled. Only one card on the shelf is affected. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate IPE faults. See "LD45" in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Controller card: NT8D01BC, NT8D01AC, NT8D01AD
- Dual loop peripheral buffer (DLB) card: QPC659 or NT5K10
- Superloop network card and network card: NT8D04, QPC414
- PE or IPE card
- PE or IPE card cage: NT8D1303, NT8D3703

Possible cause	Action
Defective PE card	<p>Replace the affected card.</p> <p>Enable the card by entering:</p> <p>LD 32 ENLC I s c "I s c" represents loop, shelf, and card numbers.</p> <p>Test the card by entering:</p> <p>LD 30 SHLF I s</p>

(continued)

Possible cause	Action
Defective controller card or DLB card	Replace the controller card or DLB card. Enable the PE card by entering: LD 32 ENLC I s c Test the card by entering: LD 30 SHLF I s
Defective network card	Replace the network card. Test the loop by entering: LOOP loop "loop" represents the loop number.
Defective backplane	Replace the card cage assembly in the module.

Symptom:

More than one peripheral equipment card disabled

More than one PE or IPE card, or two or more units on different cards, are disabled on the same shelf. There is a system message indicating that the cards or units on the cards are disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity tests can be used to isolate IPE faults. See "LD45" in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Cable between network card and PE/IPE shelf
- Controller card: NT8D01BC, NT8D01AC, NT8D01AD
- Dual loop peripheral buffer (DLB) card: QPC659 or NT5K10
- Superloop network card and network card: NT8D04, QPC414
- PE or IPE card
- PE or IPE card cage: NT8D1303, NT8D3703

Possible cause	Action
Defective controller card or DLB card	<p>Replace the controller card or DLB card.</p> <p>Enable the PE card by entering:</p> <p>LD 32 ENLC I s c "I s c" represents loop, shelf, and card numbers.</p> <p>Test the card by entering:</p> <p>LD 30 SHLF I s</p>

(continued)

Possible cause	Action
Defective cable from network card	Disable the loop for the affected shelf by entering: DISL loop "loop" represents the loop number. Replace the cable from the network card to the PE shelf. Test the loop by entering: LOOP loop
Defective network card	Replace the network card. Test the loop by entering: LOOP loop
Defective PE card	Replace the affected card. Enable the card by entering: LD 32 ENLC I s c Test the card by entering: LD 30 SHLF I s
Defective backplane	Replace the card cage assembly in the module.

Clearing trunk faults

Symptoms:

Trunk cannot make or receive calls (OVD message received)	139
Trunk cannot make or receive calls (no OVD message)	142

Trunk faults

Trunk cards provide the interface between the peripheral equipment buffer and various trunk facilities. This chapter specifically considers two types of trunk cards:

- E&M trunk card: provides four analog trunks, each of which can be individually configured to operate as:
 - E&M signaling trunk
 - Two-wire tie trunk
 - Two-wire tie trunk Type V (BPO)
 - DC-5 trunk
 - 2280 Hz tie trunk
 - Four-wire tie trunk
 - Four-wire tie trunk type V (BPO)
 - Four-wire tie trunk type C2 Earth-off Idle
 - Paging trunk
- universal trunk card: provides eight trunks, each of which can be individually configured to operate as:
 - Central Office (CO) trunk
 - Direct Inward Dialing (DID) trunk
 - Two-way tie, Dial Repeating (2DR)
 - Two-way tie, Outgoing Automatic Incoming Dial (OAID) trunk
 - Outgoing Automatic Number Identification (OANI) trunk
 - Recorded Announcement (RAN) trunk
 - Music trunk
 - Paging trunk

- Direct Inward Dial Trunk: Provides eight trunks. The signaling supported depends on the country of operation, and can include:
 - Direct Inward Dialing (DID) trunk
 - Two-way Dial Repeating (2DR)
 - Outgoing Automatic Number Identification
 - Music On Hold Equipment
- Central Office Trunk: Provides eight trunks. The signaling supported depends on the country of operation, and can include:
 - Ground Start
 - Loop Start
 - A-type signaling
 - Loop Start Disconnect Clearing
 - Loop Start Guarded Clearing

Trunk faults can cause problems (such as noise) on outside calls and can keep calls from coming in or going out.

Fault clearing procedures

Manual continuity tests can be used to isolate superloop network card and IPE faults. For a description of manual continuity tests, see *Meridian 1 general maintenance information* (553-3001-500). See “LD45” in the *X11 input/output guide* for details on performing the tests.

Table 12 lists common trunk fault indications. To clear faults, select the symptom that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: Clear any power or common equipment faults before you try to clear telephone faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 3 to see if another type of fault is indicated.

After the fault is corrected, go to “Final maintenance procedure” on page 177 to completely restore normal operation.

Table 12
Trunk fault indicators

Indicator	Possible indications
System messages	ERR090, 220, 270 OVD003, 008, 009, 010 TRK messages
Visual indicators	Red LED lit on trunk card
User reports	Users have trouble with a specific trunk Callers report continuous ringing Trouble with calls on console and/or telephones

WARNING

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Symptom:**Trunk cannot make or receive calls
(OVD message received)**

You cannot make or receive calls over a trunk and an overload (OVD) system message is received. The message indicates that only the TN for this trunk has been disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity loopback tests can be used to isolate faults to IPE, such as E&M and universal trunk cards. See “LD45” in the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- E&M trunk card: NT8D15 NT5K19, NT5K72, NT5K83
- Universal trunk card: NT8D14, NT5K07
- Central office trunk card: NT5K18, NT5K70, NT5K71, NT5K82, NT5K90, NT5K93, NT5K99, NTAG03, NTCK16
- Direct Inward Dial trunk card: NT5K17, NT5K36, NT5K84
- Any other trunk card
- Conference/TDS card: NT8D17
- DTR card: NT8D16
- Tone Detector card: NT5K20, NT5K48
- Network/DTR card: NT8D18
- Trunk equipment (such as music source or paging equipment)
- PE or IPE card cage: NT8D1303, NT8D3703

Possible cause	Action
Defective trunk card	<p>If the indicated card is an E&M or universal trunk card, unseat, then reinstall, the card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Disconnect the wiring between the card and the cross-connect terminal.</p> <p>Enable the TN by entering:</p> <p>LD 32 ENLU I s c u "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Wait for an OVD message. If you receive an OVD message, replace the card.</p> <p>If you do not receive an OVD message, reconnect the wiring and go to the next possible cause.</p>
Defective wiring	<p>At the main cross-connect terminal, disconnect the wiring to the CO or other trunk equipment (such as a music source or paging equipment).</p> <p>Enable the TN and wait for an OVD message. If you receive an OVD message, repair or replace the wiring to the PE shelf.</p> <p>If there is no OVD message, repair or replace the wiring from the cross-connect terminal to the telephone.</p> <p>If the trunk card still will not enable or there is still a trunk problem, reconnect the wiring and go to the next possible cause.</p>
Defective trunk equipment	<p>Make sure the CO equipment or other trunk equipment is not defective.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>
Defective DTR, TDS, or MFS	<p>Use the attendant console to seize trunks and audibly test for dial tone and outpulsing, or use a maintenance telephone and enter:</p> <p>LD 36 TRK I s c u</p> <p>Note: See the <i>X11 input/output guide</i> for information on using this test.</p> <p>If you do not hear outpulsing, the digitone receiver, tone and digit switch, or multifrequency sender may not be sending or receiving digits and the fault will affect more than one trunk. See the procedures for clearing faults on this equipment.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective PE shelf	<p>Unseat the affected trunk card and enable the TN.</p> <p>If you do not receive an OVD message, test superloop TNs by entering:</p> <p>LD 30 UNTT I s c u</p> <p>Test TNs on other loops by entering:</p> <p>LD 45 TEST</p> <p>If you receive an OVD message, replace the card cage assembly in the module.</p>

Symptom:

Trunk cannot make or receive calls (no OVD message)

You cannot make or receive calls over a trunk, but there is no overload (OVD) or other system message showing that the TN for this trunk is defective or has been disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Manual continuity loopback tests can be used to isolate faults to IPE, such as E&M and universal trunk cards. See "LD 45" the *X11 input/output guide* for details on performing the tests.

Note: Continually observe and look up system messages as you perform this procedure.

Replace equipment as described in *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- E&M trunk card: NT8D15, NT5K19, NT5K72, NT5K83
- Universal trunk card: NT8D14, NT5K07
- Central office trunk card: NT5K18, NT5K70, NT5K71, NT5K82, NT5K90, NT5K93, NT5K99, NTAG03, NTCK16
- Direct Inward Dial trunk card: NT5K17, NT5K36, NT5K84
- Any other trunk card
- Conference/TDS card: NT8D17
- DTR card: NT8D16
- Tone Detector card: NT5K20, NT5K48
- Network/DTR card: NT8D18
- Trunk equipment (such as music source or paging equipment)

Possible cause	Action
Defective trunk equipment	Make sure the CO equipment or other trunk equipment is not defective. If there is no problem with this equipment, go to the next possible cause.

(continued)

Possible cause	Action
Disabled or defective TN	<p>Test TNs on superloops by entering:</p> <p>LD 30 UNTT I s c u "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Test TNs on other loops by entering:</p> <p>LD 45 TEST</p> <p>If the test fails, replace the indicated item and test again.</p>
Defective trunk card	<p>If the card is an E&M or universal trunk card, unseat, then reinstall the card to initiate a self-test.</p> <p>If the test fails, replace the card.</p> <p>If the test passes, go to the next possible cause.</p>
Defective wiring	<p>At the main cross-connect terminal, disconnect the wiring to the CO or other trunk equipment.</p> <p>Enable the TN and wait for an OVD message. If you receive an OVD message, repair or replace the wiring to the PE shelf.</p> <p>If there is no OVD message, repair or replace the wiring from the cross-connect terminal to the telephone.</p> <p>If the trunk card still will not enable or there is still a trunk problem, reconnect the wiring and go to the next possible cause.</p>
Defective DTR, TDS, or MFS	<p>Use the attendant console to seize trunks and audibly test for dial tone and outpulsing, or use a maintenance telephone and enter:</p> <p>LD 36 TRK I s c u</p> <p>Note: See the <i>X11 input/output guide</i> for information on using this test.</p> <p>If you do not hear outpulsing, the digitone receiver, tone and digit switch, or multifrequency sender may not be sending or receiving digits and the fault will affect more than one trunk. See the procedures for clearing faults on this equipment.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>
Excessive traffic in the system	<p>Additional trunk cards may be required to handle the traffic in the system. See <i>Traffic measurement formats and output</i> (553-2001-450).</p>

Clearing attendant console faults

Symptoms:

Console cannot make or receive calls (OVD message received)	148
Console cannot make or receive calls (no OVD message)	150
Indicator or digit display not functioning properly	152
Operator cannot hear or be heard properly	154

Attendant console faults

Attendant consoles are the operator's interface to the system and its features. Components that can cause an attendant console fault are:

- the console itself or add-on units
- the console power supply
- the building wiring
- the cross-connect from the console to the line circuit
- the unit on the peripheral line card
- the peripheral line card
- the ringing generator
- the peripheral controller card
- the peripheral module power
- the peripheral module backplane

Attendant console faults typically affect only a single attendant. However, if more than one attendant console is affected, look for the following connections, among others:

- they are on the same line card
- they are on the same module
- they are on the same loop
- they are served by the same peripheral controller
- there is a problem with ringing or tones

Use the following software programs to isolate attendant console faults:

- LD 30 to test network loops
- LD 31 to test sets and consoles
- LD 32 to test peripheral controllers
- LD 45 to perform
 - signaling tests
 - manual continuity tests

Fault clearing procedures

Table 13 lists common attendant console fault indications. To clear faults, select the symptom that most resembles the fault indications, then go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: Clear any power or common equipment faults before you try to clear attendant console faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 3 to see if another type of fault is indicated.

After the fault is corrected, go to “Final maintenance procedure” on page 177 to completely restore normal operation.

Table 13
Attendant console fault indicators

Indicator	Possible indications
System messages	BSD501—The console (identified by loop, shelf, card, and unit) failed the signaling test. If the unit number is preceded by a minus sign, the console was disabled. There is a console fault or a fault on the peripheral equipment card indicated.
Visual indicators	Red LED lit on associated cards
User reports	Trouble with calls Trouble with equipment (such as handset, headset, or display)

WARNING

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Symptom:

Console cannot make or receive calls (OVD message received)

The attendant console cannot make or receive calls. There is an OVD message indicating that a TN for the attendant console has been disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting attendant consoles. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Attendant console
- PE or IPE card associated with the console
- CE/PE, PE, or IPE card cage: NT8D1103, NT8D1303, NT8D3703

Possible cause	Action
Defective PE card	<p>Software disable the TN indicated by the OVD message by entering:</p> <p>LD 32</p> <p>DISU l s c u "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable the TN by entering:</p> <p>ENLU l s c u</p> <p>and wait for an OVD message.</p>

(continued)

Possible cause	Action
	<p>If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective console	<p>Disable the TN. Disconnect the wiring from the console to the jack.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace the console.</p> <p>If you receive an OVD message, reconnect the wiring and go to the next possible cause.</p>
Defective wiring	<p>Disable the TN. Disconnect the wiring between the console and the cross-connect terminal.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace or repair the wiring between the console and the cross-connect terminal.</p> <p>If you receive an OVD message, replace or repair the wiring between the PE shelf and the cross-connect terminal.</p> <p>If there is still a console problem, reconnect all wiring and go to the next possible cause.</p>
Defective backplane	<p>Disable the TN. Unseat the affected PE card.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you receive an OVD message, replace the card cage assembly in the module.</p>

Symptom:

Console cannot make or receive calls (no OVD message)

The attendant console cannot make or receive calls. There is no OVD message. There may be other system messages indicating that the TN for this console is defective or has been disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting attendant consoles. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling.

Possible cause	Action
No power to console	<p>Check the power supply and wiring to see that the console is powered up.</p> <p>If there is a power supply problem, correct it.</p> <p>If there is no power problem, go to the next possible cause.</p>
Defective console	<p>Test the console by entering:</p> <p>LD 31</p> <p>Note: See the <i>X11 input/output guide</i> for information on testing consoles with LD 31.</p> <p>If the console fails the test, replace it.</p> <p>If the console passes the test, go to the next possible cause.</p>
Console connected to wrong TNs	<p>Check the cross-connect terminal to make sure the console is connected to the correct TNs.</p> <p>If the console is not connected correctly, fix the wiring.</p> <p>If the console is connected correctly, go to the next possible cause.</p>

(continued)

Possible cause	Action
Disabled TN	<p>Software disable, then reenable, each TN by entering:</p> <p>LD 32 DISU l s c u ENLU l s c u "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Test TNs on superloops by entering:</p> <p>LD 30 UNTT l s c u</p> <p>Test TNs on other loops by entering:</p> <p>LD 45 TEST</p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective wiring	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none">— Check the wiring between the console and the cross-connect terminal.— Check the wiring between the PE/IPE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p>

Symptom:

Indicator or digit display not functioning properly

The attendant console operates, but some LCD indicators or digit displays are not functioning properly. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting attendant consoles.

Possible cause	Action
Disconnected or defective power supply	Make sure the required power supplies to the attendant console are connected and are not defective. If there is still a console problem, go to the next possible cause.
Disabled TN	Software disable, then reenable, each TN by entering: LD 32 DISU l s c u ENLU l s c u "l s c u" represents loop, shelf, card, and unit numbers. Test TNs on superloops by entering: LD 30 UNTT l s c u Test TNs on other loops by entering: LD 45 TEST If there is still a console problem, go to the next possible cause.

(continued)

Possible cause	Action
Feature not assigned	<p>Make sure the feature or the indicator is assigned in software (see the <i>X11 input/output guide</i>).</p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective console	<p>Test the console by entering:</p> <p>LD 31</p> <p>(See the <i>X11 input/output guide</i> for information on testing consoles with LD 31.)</p> <p>If the console fails the test, replace it.</p>

Symptom: Operator cannot hear or be heard properly

The attendant console operates, but the user cannot hear or be heard properly. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting attendant consoles. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520).

Possible cause	Action
Defective headset or handset	<p>Make sure the handset or headset is plugged into the correct jack on the console.</p> <p>Try another handset or headset.</p> <p>If the test equipment works, replace the faulty handset or headset.</p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective console	<p>Test the console by entering:</p> <p>LD 31</p> <p>(Follow the procedures in the <i>X11 input/output guide</i> to test consoles with LD 31.)</p> <p>If the console fails the test, replace it.</p> <p>If the console passes the test, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective PE/IPE card	<p>Software disable each TN by entering:</p> <p>LD 32</p> <p>DISU l s c u "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test each TN by entering:</p> <p>ENLU l s c u</p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective wiring to console	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none">— Check the wiring between the console and the cross-connect terminal.— Check the wiring between the PE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p>

Clearing telephone faults

Symptoms:

Telephone cannot make or receive calls (OVD message received) . . .	160
Telephone cannot make or receive calls (no OVD message)	162
One end cannot hear or be heard.	164
Noise or low volume on all calls.	166
Defective indicator, digit display, or component	168
Defective feature	170
Defective add-on module	171
Cannot dial from 2500 telephone	172
No ring on 500 and 2500 telephones.	174

Telephone faults

Telephones and terminals are the user's interface to the system and its features. Components that can cause a telephone fault are:

- the telephone itself or add-on units
- the telephone power supply
- the building wiring
- the cross-connect from the telephone to the line circuit
- the unit on the peripheral line card
- the peripheral line card
- the ringing generator
- the peripheral controller card
- the peripheral module power
- the peripheral module backplane

Telephones and terminal faults typically affect only a single user. However, if more than one telephone is affected, look for the following connections, among others:

- they are on the same line card
- they are on the same module
- they are on the same loop
- they are served by the same peripheral controller
- there is a problem with ringing or tones

Use the following software programs and tests to isolate telephone faults:

- LD 30 to test network loops
- LD 31 to test sets and consoles
- LD 32 to test peripheral controllers
- LD 45 to perform signaling tests
- Meridian Modular Telephone (M2006, M2008, M2016S, and M2616) self-test

Fault clearing procedures

Table 14 lists common telephone fault indications. To clear faults, select the symptom that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Note: Clear any power or common equipment faults before you try to clear telephone faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 3 to see if another type of fault is indicated.

After the fault is corrected, go to “Final maintenance procedure” on page 177 to completely restore normal operation.

Table 14
Telephone fault indicators

Indicator	Possible indications
System messages	BSD501 ERR500 MWL500 NWS501 OVD001–002, 004, 005 XMI messages
Visual indicators	Red LED lit on associated cards
User reports	Trouble with calls Trouble with equipment (such as handset or add-on module)

WARNING

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

Symptom:

Telephone cannot make or receive calls (OVD message received)

The telephone cannot make or receive calls. There is an OVD message indicating that the TN for only this telephone has been disabled. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- PE or IPE card
- Telephone
- Wiring between the cross-connect terminal and the telephone
- Wiring between the PE/IPE shelf and the telephone
- CE/PE, PE, or IPE card cage: NT8D1103, NT8D1303, NT8D3703

Possible cause	Action
Defective PE card	<p>Software disable the TN indicated by the OVD message by entering:</p> <p>LD 32</p> <p>DISU I s c u "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable the TN by entering:</p> <p>ENLU I s c u</p> <p>and wait for an OVD message.</p>

(continued)

Possible cause	Action
	<p>If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective telephone	<p>Note: If the telephone is a Meridian Modular Telephone, enter:</p> <p>LD 32 IDU I s c u</p> <p>If there is no response, replace the telephone. If there is an appropriate response, continue this procedure.</p> <p>Disable the telephone TN. Disconnect the wiring from the telephone to the jack.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace the telephone.</p> <p>If you receive an OVD message, reconnect the wiring and go to the next possible cause.</p>
Defective wiring	<p>Disable the TN. Disconnect the wiring between the telephone and the cross-connect terminal.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace or repair the wiring between the telephone and the cross-connect terminal.</p> <p>If there is still a problem with the telephone, reconnect all wiring and go to the next possible cause.</p>
Defective backplane	<p>Disable the TN. Unseat the affected PE card.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you receive an OVD message, replace the card cage assembly in the module.</p>

Symptom:

Telephone cannot make or receive calls (no OVD message)

The telephone cannot make or receive calls. There is no OVD message or other system message indicating the TN for this telephone is defective or disabled. There may or may not be dial tone when the handset is off-hook. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520).

Possible cause	Action
No power to digital telephone	<p>Check the power supply (if one is required) and make sure it is not defective.</p> <p>If there is a power supply problem, correct it.</p> <p>If there is no problem with the power supply, go to the next possible cause.</p>
Telephone connected to wrong TNs	<p>Check the cross-connect terminal to make sure the telephone is connected to the correct TN.</p> <p>If the telephone is not connected correctly, fix the wiring.</p> <p>If the telephone is connected correctly, go to the next possible cause.</p>

(continued)

Possible cause	Action
Disabled TN	<p>Software disable, then reenable, the telephone TN by entering:</p> <p>LD 32 DISU I s c u ENLU I s c u "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Test TNs on superloops by entering:</p> <p>LD 30 UNTT I s c u</p> <p>Test TNs on other loops by entering:</p> <p>LD 45 TEST</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p>Note: If the telephone is a Meridian Modular Telephone, enter:</p> <p>LD 32 IDU I s c u</p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see "Add-on modules" in <i>Telephone and attendant console installation</i> (553-3001-215) for self-test instructions.</p>
Defective wiring	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> — Check the wiring between the telephone and the cross-connect terminal. — Check the wiring between the PE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p>

Symptom:

One end cannot hear or be heard

The person at the far end can hear you but you cannot hear them or the person at the far end cannot hear you but you can hear them. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- PE or IPE card
- Telephone handset
- Telephone
- Wiring to the telephone

Possible cause	Action
Fault on other equipment	<p>Check with the user to determine if the fault is present only on:</p> <ul style="list-style-type: none"> — Certain types of calls (such as on a paging trunk or a Tie trunk). — Calls to a specific location. — Calls to a specific telephone or other piece of equipment (such as a modem or Fax machine). <p>If the fault occurs only with certain calls, take the appropriate action.</p> <p>If the fault occurs on all calls, go to the next possible cause.</p>
Defective handset	<p>Check the receiver or transmitter in the handset. If one is defective, replace the handset or, if necessary, the telephone.</p>

(continued)

Possible cause	Action
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p>Note: If the telephone is a Meridian Modular Telephone, enter:</p> <p>LD 32 IDU l s c u</p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see "Add-on modules" in <i>Telephone and attendant console installation</i> (553-3001-215) for self-test instructions.</p>
Defective PE card	<p>Software disable the telephone TN by entering:</p> <p>LD 32 DISU l s c u "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test the TN by entering:</p> <p>ENLU l s c u</p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective wiring to telephone	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none">— Check the wiring between the telephone and the cross-connect terminal.— Check the wiring between the PE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p>

Symptom:

Noise or low volume on all calls

There is noise on the line on all calls or the volume is lower than usual on all calls. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- PE or IPE card
- Telephone
- Wiring to the telephone

Possible cause	Action
Defective wiring	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none">— Check the wiring between the telephone and the cross-connect terminal.— Check the wiring between the PE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p> <p>If there is no problem with the wiring, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p>Note: If the telephone is a Meridian Modular Telephone, enter:</p> <p>LD 32 IDU I s c u</p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see "Add-on modules" in <i>Telephone and attendant console installation</i> (553-3001-215) for self-test instructions.</p>
Defective PE card	<p>Software disable the telephone TN by entering:</p> <p>LD 32 DISU I s c u "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test the TN by entering:</p> <p>ENLU I s c u</p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p>

Symptom:

Defective indicator, digit display, or component

The telephone can place and receive calls, but one or more LED or LCD indicators, digit displays, or components (such as a handsfree unit) are not working. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Power supply to telephone
- PE or IPE card
- Telephone

Possible cause	Action
Telephone has incorrect software parameters	Disconnect, then reconnect, power to the telephone to force a reset and parameter download. If the fault is not cleared, go to the next possible cause.
No power to digital telephone	Check the power supply (if one is required) and make sure it is not defective. If there is a power supply problem, correct it. If there is no problem with the power supply, go to the next possible cause.

(continued)

Possible cause	Action
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p>Note: If the telephone is a Meridian Modular Telephone, enter:</p> <p>LD 32 IDU I s c u</p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see "Add-on modules" in <i>Telephone and attendant console installation</i> (553-3001-215) for self-test instructions.</p>
Feature not assigned	<p>Make sure the feature or the indicator is assigned in software (see the <i>X11 input/output guide</i>).</p>

Symptom:

Defective feature

The telephone can make and receive calls, but one or more of its features (such as call transfer or ring again) is not working. Look up all system messages and maintenance display codes in the *X11 system messages guide* (553-3001-411) and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones.

Possible cause	Action
Feature not assigned	<p>Make sure the feature or the indicator is assigned in software (see the <i>X11 input/output guide</i>).</p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p>Note: If the telephone is a Meridian Modular Telephone, enter:</p> <p>LD 32 IDU I s c u</p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see "Add-on modules" in <i>Telephone and attendant console installation</i> (553-3001-215) for self-test instructions.</p>

Symptom:

Defective add-on module

The telephone can make and receive calls, but an add-on module connected to it is not working. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. You may need to replace one of the following:

- Add-on module
- Data option card
- Power supply for add-on module

Possible cause	Action
Defective power supply for add-on module	If the add-on module requires a separate power supply, make sure it is properly connected and in working order. If there is still a problem with the telephone, go to the next possible cause.
Defective add-on module	Replace the add-on module.
Defective data option card	If the fault is with a data add-on module, replace the data option card.

Symptom:

Cannot dial from 2500 telephone

A user cannot dial from a 2500 telephone. The condition may exist on more than one telephone and may be intermittent. The telephone may occasionally experience a "no dial tone" condition. Calls from other types of sets are not affected. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- DTR card: NT8D16
- Tone Detector card: NT5K20, NT5K48
- Network/DTR card: NT8D18
- Telephone
- Wiring to the telephone

Possible cause	Action
Defective telephone	<p>If only one telephone is affected, replace it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective wiring	<p>If only one telephone is affected, make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none">— Check the wiring between the telephone and the cross-connect terminal.— Check the wiring between the PE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective digitone receiver	<p>If the condition is intermittent or more than one telephone is affected, test the digitone receivers in the system by entering:</p> <p>LD 34 DTR l s c u "l s c u" represents loop, shelf, card, and unit numbers of the DTR.</p> <p>Replace any units that fail the test.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Excessive Digitone traffic	<p>Additional digitone receivers may be required to handle the traffic in the system. See <i>Traffic measurement formats and output</i> (553-2001-450).</p>

Symptom:

No ring on 500 and 2500 telephones

Both 500 and 2500 telephones do not ring. One or several sets in the same module are experiencing the problem. Look up all system messages and maintenance display codes in the *X11 system messages guide* and follow the instructions given. If the fault does not clear, use this procedure.

Note: Continually observe and look up system messages as you perform this procedure.

See *Telephone and attendant console installation* (553-3001-215) for information on connecting telephones. See *Meridian 1 system installation procedures* (553-3001-210) for information on system cabling. To replace other equipment, see *Meridian 1 hardware replacement* (553-3001-520). You may need to replace one of the following:

- Ringing generator: NT6D42, NT8D21
- PE or IPE card
- Telephone
- Wiring to the telephone
- CE/PE, PE, or IPE card cage: NT8D1103, NT8D1303, NT8D3703

Possible cause	Action
Defective telephone	<p>If only one telephone is affected, replace it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective wiring	<p>If only one telephone is affected, make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> — Check the wiring between the telephone and the cross-connect terminal. — Check the wiring between the PE shelf and the cross-connect terminal. <p>If there is a wiring problem, correct it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>

(continued)

Possible cause	Action
Defective PE card	<p>Software disable the telephone TN by entering:</p> <p>LD 32</p> <p>DISU l s c u "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test the TN by entering:</p> <p>ENLU l s c u</p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective controller card	<p>If several sets on different cards in the same loop are affected, replace the controller card.</p> <p>If there is still a problem with the telephone, reinstall the original controller card and go to the next possible cause.</p>
Defective ringing generator	<p>If several sets on different cards in the same module are affected, replace the ringing generator for the shelf (even if the green LED on the unit is lit).</p> <p>If there is still a problem with the telephone, reinstall the original ringing generator and go to the next possible cause.</p>
Defective backplane	<p>If the green LED is lit on the ringing generator and the fault persists, replace the card cage assembly in the module.</p>

Final maintenance procedure

Introduction

Perform the final maintenance procedure (Procedure 4) to verify that the Meridian 1 is operating properly and that there are no remaining faults.

Procedure 4 **Final maintenance procedure**

- 1 Make sure all cards that may have been removed are reinserted in their assigned location and enabled.
- 2 Make sure all wiring and connectors that may have been disconnected are reconnected.
- 3 Make sure all loops and shelves that should be enabled are enabled.

Note: Digital telephones on a network loop that was disabled may not be restored when the loop is enabled. Each telephone should be individually disabled and reenabled through LD 32. Service may also be restored by disconnecting and reconnecting the telephone line cord.
- 4 Make sure all circuit breakers are set to ON and any fuses (in power panels or auxiliary equipment) are inserted.

- 5 Clear fault indicators by entering:

LD 35 or (**LD 135** for options 51C, 61C, 81, and 81C)

To clear the maintenance display in a single CPU system, enter:

CDSP

To clear the maintenance display in a dual CPU system, clear the display on one CPU by entering:

CDSP

Test the CPU by entering:

TCPU (LD 35), or

TEST CPU (LD 135 for options 51C, 61C, 81, and 81C)

If the response is "OK," switch CPUs by entering:

SCPU

Clear the display on the other CPU by entering:

CDSP

To clear a major alarm indication and restore Power Fail Transfer Units (PFTUs) to normal operation, enter:

CMAJ

To clear a minor alarm indication from all attendant consoles, enter:

CMIN ALL

- 6 Set the midnight routine to run after you log out of the system with:

MIDN

End the session in LD 35 or LD 135 and log out of the system:

LOGO (The midnight routine will now run.)

- 7 Check system messages produced when the midnight routine runs.
Clear any faults indicated.

- 8** If there was a sysload (reload) while you were clearing a fault, reset the correct time and date by entering:

LD 2

STAD (day) (month) (year) (hour) (minute) (second)

Check the time and date you entered:

TTAD

End the session in LD2 and log out of the system:

LOGO

- 9** Replace any covers you removed from modules.
- 10** Tag defective equipment with a description of the fault and return it to a repair center.

List of terms

3PE card

QPC441 Three-Port Extender Card

BTU

QPC477 Bus Terminating Unit

CBT

Core Bus Terminator

CE

Common Equipment

CE/PE

Common/Peripheral Equipment

CMA card

Changeover and Memory Arbitrator Card

CMDU card

Core Multi Disk Unit Card

Conference/TDS card

NT8D17 Conference/Tone and Digit Switch Card

CNI

Core to Network Interface

CP

Call Processor

CPU

Central Processing Unit

DLB card

QPC659 Dual Loop Peripheral Buffer Card

DTR card

Digitone Receiver Card

Network/DTR card

NT8D18 Network/Digitone Receiver Card

FDI card

QPC742 Floppy Disk Interface Card

FDU

NT8D68 Floppy Disk Unit

FN card

QPC579 CPU Function Card

IF card

QPC580 CPU Interface Card

IOP

Input/Output Processor

IPE

Intelligent Peripheral Equipment

MDU

NT8D69 Multi Disk Unit

MSI card

QPC742 Mass Storage Interface Card

PE

Peripheral Equipment

PS card

QPC43 Peripheral Signaling Card

ROM cards

Read Only Memory Cards

SBE

QPC215 Segmented Bus Extender Card

SDI cards

Serial Data Interface Cards

UPS

Uninterruptible Power Supply

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Meridian 1
Meridian 1
Fault clearing

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**HARDWARE
REPLACEMENT
553-3001-520**

Meridian 1

Meridian 1

Hardware replacement

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About this document

This document tells you how to replace hardware in Meridian 1 systems. In this manual, “replacing hardware” means removing a faulty piece of equipment and installing identical operating equipment. The procedures in this document are based on the assumption that the system is properly installed (for example, all card locations, option switch settings, and cable connections are correct) and was fully operational before the hardware fault.

To use this document, you should have a basic knowledge of Meridian 1 maintenance procedures. Generally, only common tools (such as socket wrenches, screwdrivers, and pliers) are required to perform these procedures.

This document does not provide procedures for locating and clearing faults. See *Meridian 1 fault clearing* (553-3001-510) to locate and clear faults.

References

See the *Meridian 1 planning and engineering guide* for:

- *Meridian 1 system overview* (553-3001-100)
- *Spares planning* (553-3001-153)
- *Meridian 1 equipment identification* (553-3001-154)

See the *Meridian 1 installation and maintenance guide* for:

- *Meridian 1 system installation procedures* (553-3001-210)
- *Circuit card installation and testing* (553-3001-211)
- *Telephone and attendant console installation* (553-3001-215)
- *Meridian 1 general maintenance information* (553-3001-500)
- *Meridian 1 fault clearing* (553-3001-510)

See the *X11 software guide* for an overview of software architecture, procedures for software installation and management, and a detailed description of all X11 features and services. This information is contained in two documents:

- *X11 software management* (553-3001-300)
- *X11 features and services*

See the *X11 input/output guide* for a description of all administration programs and maintenance programs. Also, see the *X11 system messages guide* for interpreting system messages.

Accessing the system

When you replace equipment, you often send commands to the system software in order to disable faulty equipment and to enable and test newly installed equipment.

You send maintenance commands to the system through the system terminal or the maintenance telephone. This section gives the procedures for accessing the system through these devices.

Note: Before X11 release 19, only one device at a time can communicate with the system. Accessing a device while another is logged in will log out the device that was already connected. The Multi User Login feature, available with X11 release 19 and later, allows more than one device to interact with the Meridian 1. Refer to *X11 system management applications* (553-3001-301) for details on using this feature.

Access through the system terminal

You can send maintenance commands and receive system messages by accessing the CPU through an RS-232 device, such as a video display terminal (VDT) or teletypewriter (TTY).

When you access the system through a system terminal, a login procedure is required (see Procedure 1). All system passwords are initially set as 0000, but you can change passwords in the Configuration Record (LD 17).

Note: If a sysload occurs before you save a new password in a data dump, the last active password remains valid.

Each system has two levels of passwords: level 1 is for general use, level 2 is for administrative use. Either password is accepted in the login procedure.

Procedure 1
Access through the system terminal

- 1 Press the return key.
 - If the response is a period (.), you are ready to log into the system.
 - If the response is
OVL111 nn TTY x or **OVL111 nn SL1**
someone else is logged into the system. When they have logged off, press return and go to Step 2.
 - If the response is
OVL111 nn IDLE or **OVL111 nn BKGD**
you are ready to log into the system. Go to Step 2.
 - If the response is
OVL000 >
you are already logged into the system. Go to Step 4.

Note: Responses vary with different Background Terminal packages.

- 2 Log into the system by entering
LOGI
then press the return key.

The normal response is
PASS?
If there is any other response, see the *X11 input/output guide* (553-3001-400).
- 3 Enter either the level 1 or level 2 password and press the return key.
If the password is correct, the system responds with the prompt **>**.
- 4 Load a program by entering
LD xx "xx" represents the number of the program
- 5 Perform tasks.
- 6 End the program by entering
END or ********
- 7 Always end the login session with
LOGO
Background routines are then loaded automatically.

Access through the maintenance telephone

A telephone functions as a maintenance telephone when you define the class-of-service as MTA (maintenance set allowed) in the Multi-line Telephone Administration program (LD 11). A maintenance telephone allows you to send commands to the system through the following maintenance overlays: LD 30, LD 32, LD 33, LD 34, LD 35, LD 36, LD 37, LD 38, LD 41, LD 42, LD 43, LD 45, LD 46, LD 60, LD 61, and LD 62.

Note: The Core Common Equipment Diagnostic (LD 135) and Core I/O Diagnostic (LD 137) are among the overlays that cannot be accessed through a maintenance telephone.

You can test tones and outpulsing through the maintenance telephone. Specific commands for those tests are given in the Tone and Digit Switch and Digitone Receiver Diagnostic (LD 34).

To access the system using the maintenance telephone, see Procedure 2. To enter commands, press the keys that correspond to the letters and numbers of the command (for example, to enter *LD 42 return*, key in *53#42##*). Table 1 shows the translation from a terminal keyboard to a telephone dial pad.

Note: To use the maintenance telephone, the peripheral equipment loop for that telephone must be operating.

Table 1
Translation from keyboard to telephone dial pad

Keyboard			Dial pad	
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
			Space or #	#
			Return	##
Note: There is no equivalent for Q or Z on a dial pad.				

Procedure 2**Access through the maintenance telephone**

- 1 Press the prime DN key.
- 2 Place the set in maintenance mode by entering
xxxx91 "xxxx" is the customer Special Prefix (SPRE) number. It is defined in the Customer Data Block and can be printed using LD 21. The SPRE number is typically "1" (which means you would enter 191).
- 3 Check for busy tone by entering "return"
##
 - If there is no busy tone, go to Step 4.
 - If there is a busy tone, a program is active. To end an active program and access the system enter

- 4 Load a program by entering
53#xx## "xx" represents the number of the program
- 5 Perform tasks.
- 6 Enter ******** to exit the program and return the telephone to call processing mode. Background routines are then loaded automatically.

Hardware replacement guidelines

Precautions

To avoid personal injury and equipment damage, review the following guidelines before handling Meridian 1 equipment.

Power equipment

There are no user-repairable components in the power system. If a power supply fails, the complete unit must be replaced. Do *not* disassemble a power supply under any circumstances.

WARNING

To avoid the danger of electric shock, be very careful when you work with power equipment and connections. Warning notices are displayed and *must* be heeded.

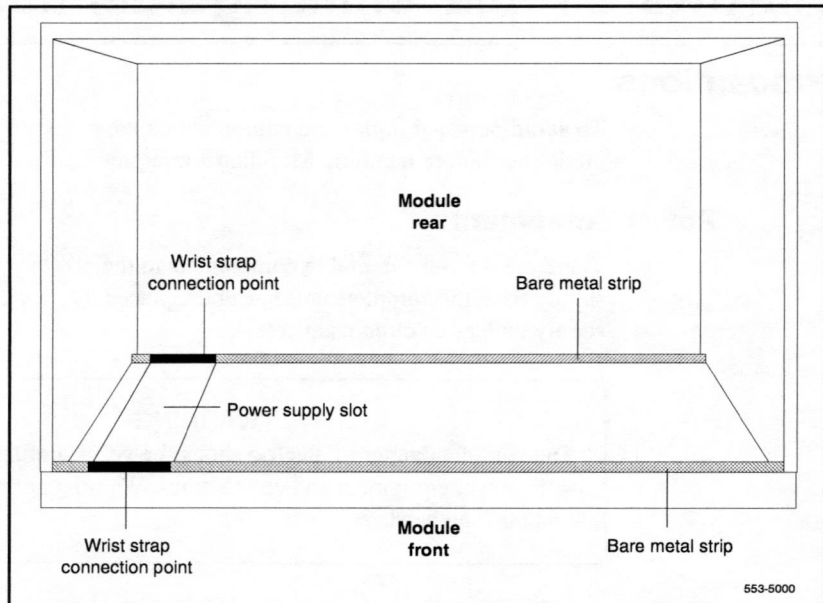
Circuit cards

Handle cards as follows:

- Unpack or handle cards away from electric motors, transformers, or similar machinery.
- Handle cards by the edges only. Do not touch the contacts or components.
- Set cards on a protective antistatic bag. If an antistatic bag is not available, hand-hold the card, or set it in a card cage unseated from the connectors.
- Store cards in protective packing. Do not stack cards on top of each other unless they are packaged.

To avoid card damage from static discharge, wear a properly connected antistatic wrist strap when you work on Meridian 1 equipment. If a wrist strap is not available, regularly touch one of the bare metal strips in a module to discharge static. Figure 1 shows the recommended connection points for the wrist strap and the bare metal strips you should touch.

Figure 1
Static discharge points



During replacement procedures:

- Turn off the circuit breaker or switch for a module power supply before the power supply is removed or inserted.

Note: In AC-powered systems, capacitors in the power supply must discharge. Wait five full minutes between turning off the circuit breaker and removing the power supply from the module.

- Software disable cards, if applicable, before they are removed or inserted.
- Hardware disable cards, whenever there is an enable/disable switch, before they are removed or inserted.
- Return defective or heavily contaminated cards to a repair center. Do not try to repair or clean them.

Data disks

Follow the precautions below to avoid damaging disks:

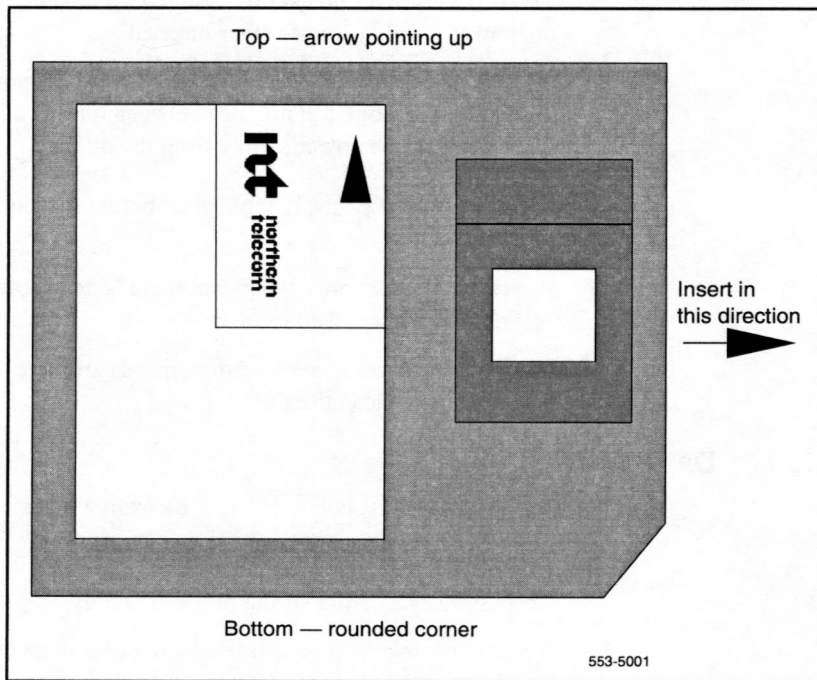
- Handle only the hard surface; never touch the recording surface.
- Keep disks away from strong magnetic fields.
- Avoid exposing disks to extreme heat, rapid changes in temperature, or high humidity.
- Store disks in a suitable container.

To install a disk, make sure the arrow on the label is pointing up and the rounded corner is on the bottom on the right-hand side (see Figure 2).

CAUTION

The disk drive can be damaged if an upside-down disk is forced into the slot. If there is significant resistance when you try to insert a disk, remove the disk and check the position.

Figure 2
Disk position



Options 51C, 61C, 81, and 81C cable guidelines

To disconnect a cable from the Core or Core/Network Module backplane, use the P0741489 Extraction Tool provided in the rear of the module (behind the I/O safety panel).

CAUTION

You must use the P0741489 Extraction Tool to disconnect cables from the backplane shrouds in NT6D60 Core, NT9D11 and NT5D21 Core/Network Modules.

Follow the procedure below to avoid bending or breaking pins when removing cable connectors from the backplane shrouds. Do not insert the extraction tool unless the cable connector is locked into the shroud. Do not force the extraction tool deeper than the detent on the cable connector.

- 1 Grasp the cable connector by the strain relief tab.
- 2 Center the longer flat edge on the angled end of the tool between the cable connector and the wall of the shroud on the right side of the cable connector.

Note: If the straight end of the tool is notched, use that end if the connector can be accessed straight-on. If you must angle the tool at all, use the angled end.

- 3 *Gently* insert the extraction tool and gradually apply pressure while gently rocking the cable connector up and down.
- 4 Stop applying pressure as soon as the detent of the cable connector comes loose from the shroud.
- 5 Slowly remove the extraction tool and the cable connector.

Before you connect cables to the backplane, visually inspect the backplane shroud connectors to make sure there are no bent pins. To connect cables:

- 1** Orient the cable connector so the strain relief paddle is to the right.
- 2** Partially insert the cable connector so its guides mate to the corresponding backplane connector.
- 3** Apply a small amount of pressure to push the cable connector straight into the backplane connector. You will feel a detent click when the connector seats.

CAUTION

Pins may be bent or broken if you try to insert the cable connector at an angle. Do not push the connector in any further after you hear the detent click.

Replacing equipment

Removing module covers and pedestal grills

Module covers

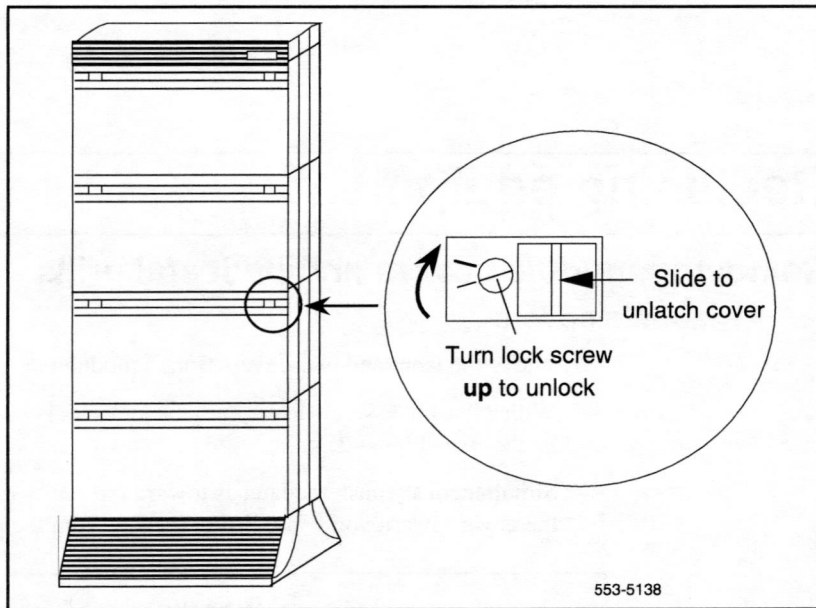
To remove the front and rear covers from a module:

- With a flat-blade screwdriver, turn the lock clockwise on the two locking latches (see Figure 3).
- Simultaneously push the latches toward the center of the cover and pull the cover toward you while lifting it away from the module.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Figure 3
Locking latches on the module cover

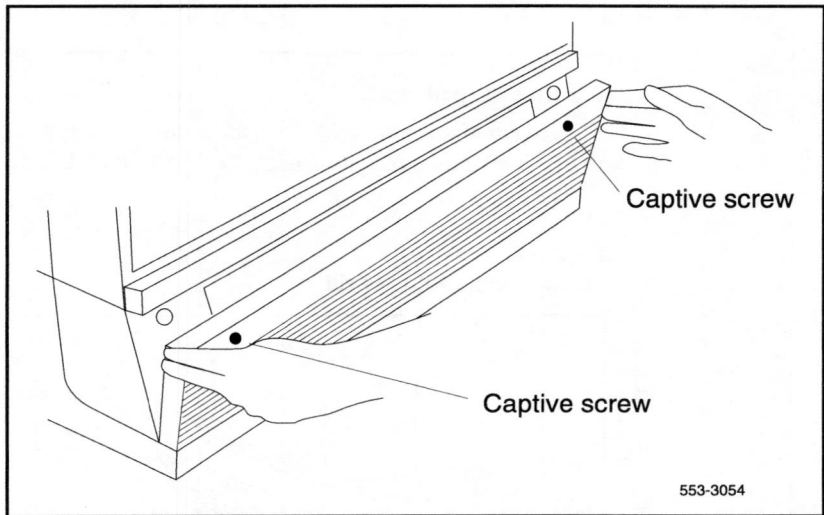


Pedestal grills

To remove the front and rear grills on the pedestal:

- Loosen the two captive screws that secure the grill.
- Pull the grill forward and lift it out of the base of the pedestal (see Figure 4).

Figure 4
Removing the pedestal grill



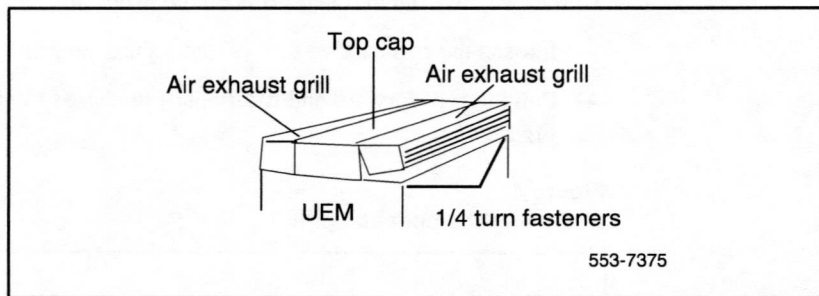
Removing UK air exhaust/intake grills

Use the following procedures to remove or replace the exhaust and intake grills on United Kingdom (UK) equipment.

Air exhaust grill

The front and rear air exhaust grills are secured by Southco fasteners located underneath the front edge of the grill. Use a #1 Phillips head screwdriver and turn the fasteners 1/4-turn to release or secure the grill (see Figure 4).

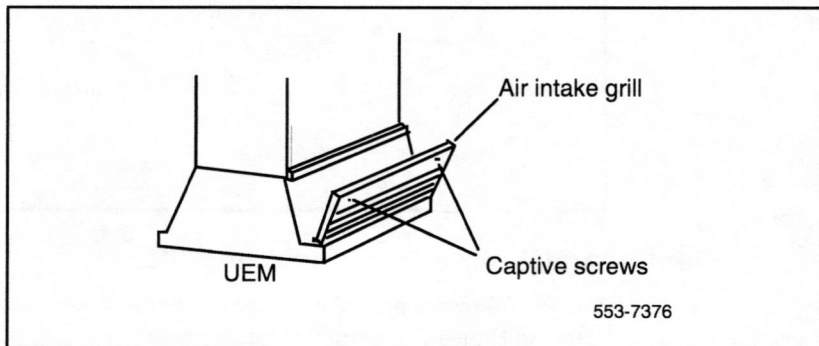
Figure 5
Removing air exhaust grill



Air intake grill

The front and rear air intake grills are secured by captive panel screws located in the face of the grill (see Figure 4). Use a slotted screwdriver to release or secure the grill.

Figure 6
Removing air intake grill



A0321130 Fan Unit

Use this procedure to replace the fan unit used in option 21A.

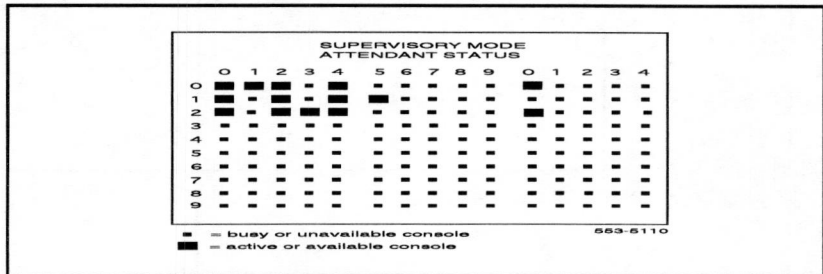
WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disconnect power to the top cap fan:
 - Remove the rear cover on the module.
 - Remove the I/O safety panel over the backplane.
 - At the top of the rear of the module, disconnect the orange connector from the module power harness.
- 2 Remove the top cap:
 - Remove air exhaust grills at the front and rear of the top cap. Pull forward on the two clips underneath the front edge of each grill and lift up to remove the grill (see Figure 7).

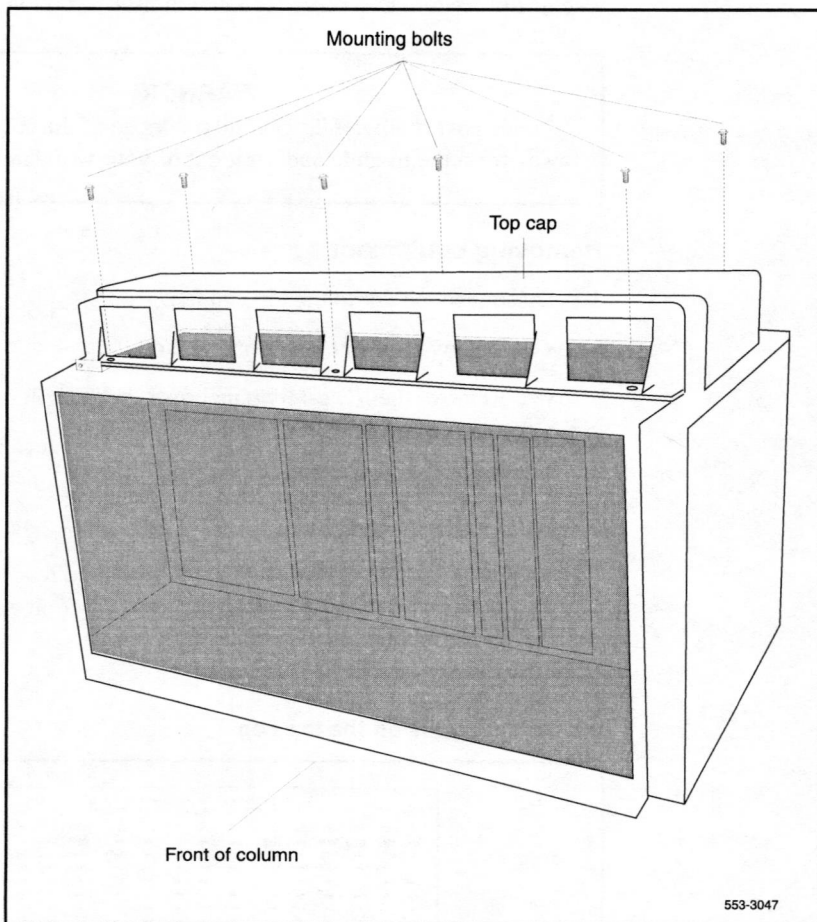
Figure 7
Air exhaust grills on the top cap



- Use a 5/16" socket wrench to remove the six bolts that secure the top cap (see Figure 8). Lift off the top cap only.

Note: You do not need to remove the perforated panel on the top of the module.

Figure 8
Top cap assembly



3 Remove the top cap fan:

- Remove the four corner screws that secure the fan and the metal cover plate on top of the fan. Keep the cover plate handy; you will use it with the replacement fan.
- Disconnect the black cord from the plug on the front of the fan.

Installing equipment**1 Install the replacement top cap fan:**

- Position the fan. The air flow arrow must point *up*, and the plug on the black cord must face the *front* of the module.
- Connect the black cord to the plug on the front of the fan.
- Place the cover plate on top of the fan. Install the four corner screws that secure the fan and cover plate.

2 Install the top cap:

- Position the top cap and install the six bolts that secure it.
- Install the air exhaust grills at the front and rear of the top cap.

3 Connect power to the top cap fan:

- At the top of the rear of the module, connect the orange connector to the module power harness.
- Replace the I/O safety panel.
- Replace the rear cover on the module.

4 Tag defective equipment with a description of the problem and package it for return to a repair center.

A0378252 Battery Pack Assembly

The battery pack assembly is attached to the NTND02 Misc/SDI/Peripheral Signaling (MSPS) Card. Use this procedure to replace a battery pack.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the MSPS card is removed. An initialization will occur when a new card is installed.

Removing equipment

1 To replace the battery pack you must remove the MSPS card:

- Software disable each serial data interface (SDI) port configured on the MSPS card:

LD 37

DIS TTY X

“x” is the number of the interface device attached to the port

- Set the ENB/DIS switch to DIS.
- Disconnect the SDI cable from the faceplate connector.
- Unhook the locking devices on the card; pull it out of the card cage.

2 Remove the battery pack from the MSPS card:

- Disconnect the wire from the battery pack assembly to the connector on the MSPS card. Unplug the clip connector wired to the battery pack.
- On the back side of the MSPS card, remove the three screws that secure the battery pack.

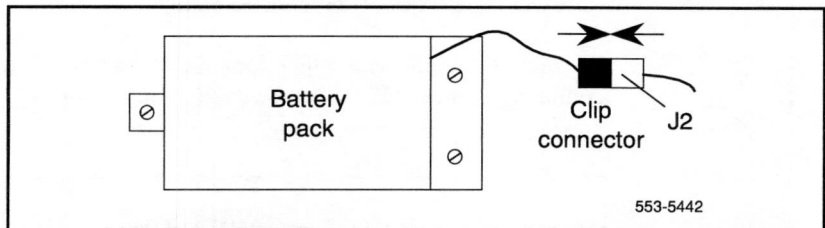
Installing equipment

1 Install the battery pack on the MSPS card:

- Position the battery pack on the component side of the MSPS card; install the screws for the battery pack from the back of the card.
- On the component side of the MSPS card, plug in the clip connector wired to the battery pack. Make sure the connector key is centered on J2 (see Figure 9).

Note: The battery will not be fully charged until 24 hours after installation in a powered system.

Figure 9
Connector for the battery pack assembly



2 Reinsert the MSPS card and hook the locking devices:

- Connect the SDI cable to the card.
- Set the ENB/DIS switch to ENB.
- Set the ENB/DIS switch on the NT8D18 Network/DTR Card to DIS, then back to ENB.
- Press the initialize (Init) button on the NTND01 ICM Card to activate a clean initialization.

- Software enable each SDI port configured:

LD 37

ENL TTY x

TTY x

The response should be:

ABCDEFGHIJKLMNOPQRSTUVWXYZ

0123456789"#\$%*!&()<>-.:,.? READY FOR INPUT

Anything entered on the keyboard will be echoed until END is input.

If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.

If there is no problem, exit LD 37:

- 3 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTAG26 Extended Multi-frequency receiver

Use the following procedure to replace a defective NTAG26 Multi-frequency Receiver Card (XMFR) in the IPE module.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Service is interrupted when a loop is disabled.

Removing equipment

- 1 Software disable the XMFR by entering
LD 32
DISS 1 s
("1 s" represents loop and shelf number)
- 2 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Insert the replacement card into the vacated slot and hook the locking devices.
- 2 Software enable the loop on the card by entering
ENLS 1 s
- 3 End the session in LD 32 by entering

- 4 Test the loop on the card by entering
LD 30
LOOP 1

If there is a problem, an NWS system message will be produced and the appropriate red LED will light on the faceplate of the card.

- 5 End the session in LD 30 by entering

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT5K09 Quad Digitone Receiver

Use the following procedure to replace a defective Quad DIGITONE Receiver Card in the NT5K11 EEPE shelf.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Service is interrupted when a loop is disabled.

Removing equipment

- 1 Software disable the Quad DTMF Receiver by entering
LD 32
DISS l s
("l s" represents loop and shelf number)
- 2 Remove the backplane access plate at the rear of the UEM by removing the screws on each side. Set the plate aside.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Check that the plug P2 On the replacement card is oriented in the same way as the card being replaced.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Position the backplane access plate. Replace the screws.
- 4 Software enable each loop on the card by entering
ENLS 1 s
- 5 End the session in LD 32 by entering

- 6 Test each loop on the card by entering
LD 30
LOOP 1

If there is a problem, an NWS system message will be produced and the appropriate red LED will light on the faceplate of the card.

- 7 End the session in LD 30 by entering

- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT5K10 Dual Loop Peripheral Buffer Card

Use this procedure to replace a defective Enhanced Dual Loop Peripheral Buffer (IDLB) card in the NT5K11 shelf.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Service is interrupted when a loop is disabled.

Removing equipment

- 1 Software disable the Dual Loop Peripheral Buffer by entering
LD 32
DISS l s
("l s" represents loop and shelf number)
- 2 Remove the Backplane access plate at the rear of the UEM by removing the screws on each side. Set the plate aside.
- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set option switches on the replacement card the same as on the card you removed.

To check switch settings, see Circuit pack installation and testing (553-3001-211) in the SL-1 installation and maintenance guide.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.

- 3 Connect cables to the replacement card.
- 4 Position the backplane access plate. Replace the screws.
- 5 Software enable each loop on the card by entering
ENLS 1 s
- 6 End the session in LD 32 by entering

- 7 Test each loop on the card by entering
LD 30
LOOP 1

If there is a problem, an NWS system message will be produced and the appropriate red LED will light on the faceplate of the card.

- 8 End the session in LD 30 by entering

- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT5K1106 Enhanced Peripheral Equipment Card Cage

To replace a defective NT5K1102 Enhanced Peripheral Equipment Backplane in the NT5K11 EEPE UEM, you must replace the NT5K1106 Enhanced Peripheral Equipment Card Cage Assembly. Use this procedure to replace the unit.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

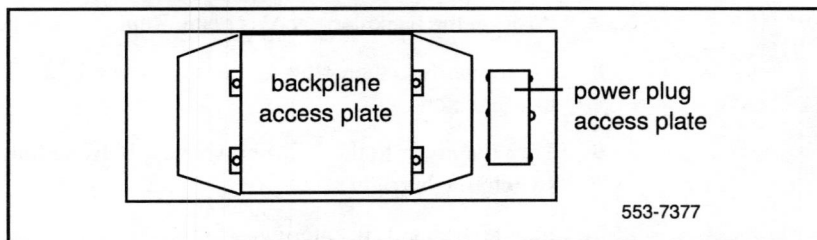
Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disable the EEPE Enhanced Peripheral Equipment shelf by entering
 LD 32
 DISS 1 s
 ("1 s c" represents loop, shelf number)

 If a second shelf is assigned to a loop, disable that shelf also by entering
 DISSI 1 s
 - If the shelf is in single loop mode, two loops are disabled.
 - If the shelf is in dual loop mode, four loops are disabled.
- 2 Turn off power to the UEM power supply by setting the switch on the NT5K12 Enhanced Equipment power supply to OFF(left).
- 3 Remove all cards from the shelf of the UEM:
 - Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
- 4 Disconnect cables, plugs, and wires from the back of the UEM to the backplane:
 - Remove the Backplane access plate by removing the screws on each side (see Figure 10). Set the panel aside.
 - Remove all cards from the back of the UEM.
 - Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 5 Remove the two mounting screws that secure the back of the card cage to the UEM assembly.
- 6 Remove the front cover plates on both sides of the card cage.
- 7 Remove the three mounting screws that secure the front of the card cage to the bottom of the UEM assembly. Pull the card cage out of the UEM.

Figure 10
EEPE access plates (rear view)



- 8 Slide the replacement card cage into position in the UEM leaving approximately 3" clearance between the card cage and the backplane.
- 9 Reconnect cables, plugs, and wires from the UEM to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Position the backplane access plate. Replace the screws.
 - Connect all plugs, wires, and cables to the backplane.

Installing equipment

- 1 Slide the replacement card cage into position in the UEM taking care not to pinch the cables.
- 2 Install the three mounting screws that secure the front of the card cage to the bottom of the UEM assembly.
- 3 Replace the front cover plates on both sides of the card cage.
- 4 Install the mounting screws at the back of the card cage.
- 5 Reconnect cables, plugs, and wires from the UEM to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Connect all plugs, wires, and cables to the backplane.
 - Position the power plug access plate. Replace the screws.

- 6 Return cards to their slots at the rear of the UEM. Reconnect all cables to connectors.
- 7 Position the backplane access plate. Replace the screws.
- 8 Return cards to their slots at the front of the UEM. Reconnect all cables to connectors.
- 9 Turn on power to the UEM power supply by setting the power supply switch to ON (right):
- 10 Enable the shelf by entering
ENLS 1 s

If a second shelf is assigned to a loop, enable that shelf also by entering
ENLS 1 s

End the session in LD 32 by entering

- 11 Test the shelf by testing each loop with
LD 30
LOOP 1 s

If there is a problem, an NWS system message will be produced.
- 12 End the session in LD 30 by entering

- 13 Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing the NT5K21AA Circuit Card

Use this procedure to replace a NT5K21AA card in an IPE Modules.

WARNING

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Software disable the card:

LD 32

STAT l s c

DIS l s c

("l s c" represents loop, shelf, and card number)

You will see "NPR011" on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

You will see the LED light up when the card becomes disabled.

- 2 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Insert the replacement card into the vacated slot and hook the locking devices.

Note: When IPE cards are installed, the red LED on the faceplate remains lit for 2 to 5 seconds as a self-test runs. If the self-test completes successfully, the LED flashes three times and remains lit until the card is configured and enabled in software, then the LED turns off. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), replace the card.

- 2 Software enable the card:

LD 32

ENLC l s c

When the process is complete, you will receive a system response

STAT l s c

Obtain the status of the card to ensure that the card is enabled

To exit the program

- 3 (Optional): Test the card:

LD 30

SHLF l s

("l s" represents loop, shelf number)

Note: This command tests every card on the designated shelf.

If there is a problem, an NWS system message is generated and the red LED(s) on the faceplate of the card will remain lit.

If there is no problem, exit LD 30.

- 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT1P61 Fibre Superloop Network Card

Use this procedure to replace an NT1P61 Fibre Superloop Network card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing and replacing a Fibre Superloop Network card

- 1 Disable the Fibre Superloop Network card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DIS loop**, where **loop** is the actual loop number of the Fibre Superloop Network card.
- 2 Set the ENB/DIS switch to DIS.
- 3 Disconnect all the fibre-optic patchcords and the SDI/System Monitor cable from the card faceplate.
- 4 Unlatch the card's locking devices by squeezing the tabs and pulling the upper locking device away from the card and pressing the lower locking device downward.
- 5 Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6 Check the replacement card and make sure that the Electro-optical packlets are already installed. If not installed, install the new packlets or remove the packlets from the faulty Fibre Superloop Network card and install them on the replacement card if you are sure that the packlets are not faulty.
- 7 Set the replacement card ENB/DIS switch to DIS.
- 8 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.

- 9 Pull the upper locking device away from the faceplate on the card and press the lower locking device downward and insert the card firmly into the backplane connector. Press the upper locking device firmly against the faceplate and press the lower locking device upwards to latch the card inside the module.
- 10 Set the ENB/DIS switch on the Fibre Superloop Network card to ENB. The Fibre Superloop Network card automatically starts the self-test.
- 11 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test; go on to step 13. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Fibre Superloop Network card.
- 12 Connect the SDI/System Monitor cable and the fibre-optic patchcords to the faceplate connectors of the replacement Fibre Superloop Network card.
- 13 Enable the Fibre Superloop Network card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **ENLL loop**, where **loop** is the actual loop number of the Fibre Superloop Network card.
- 14 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

NT1P62 Fibre Peripheral Controller Card

Use this procedure to replace a Fibre Peripheral Controller card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing and replacing a Fibre Peripheral Controller card

- 1 Load Network and Peripheral Equipment Diagnostic Program LD 32. At the > prompt, type **LD 32** and press the Enter key to access the program.
- 2 Type **DSXP x**, where **x** is the Fibre Peripheral Controller card, and press the Enter key to disable the card. The Fibre Peripheral Controller card is now disabled and you can remove it.
- 3 Disconnect all the fibre-optic patchcords from the card faceplate.
- 4 Unlatch the card's locking devices by squeezing the tabs and pulling the upper locking device away from the card and the lower locking device downwards.
- 5 Pull the card out of the IPE module or cabinet and place it in an antistatic bag away from the work area.
- 6 Check the replacement card and make sure that the Electro-optical packlets are already installed. If not installed, install the new packlets or remove the packlets from the faulty Fibre Peripheral Controller card and install them on the replacement card if you are sure the packlets are not faulty.
- 7 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.

- 8 Pull the upper locking device away from the faceplate on the card and the lower locking device downwards and insert the card firmly into the backplane connector. Press the upper locking device firmly against the faceplate and the lower locking device upwards to latch the card inside the module. The Fibre Peripheral Controller card automatically starts the self-test.
- 9 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 11. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Fibre Peripheral Controller card.
- 10 Connect the fibre-optic patchcords to the optical connectors of the Fibre Peripheral Controller card faceplate. For a wall-mounted Fibre Remote IPE, plug the fibre-optic span FC/PC optical connectors into the FC/PC optical connectors on the Fibre Peripheral Controller card faceplate.
- 11 At the prompt in the LD 32 program, type **ENXP x**, where **x** is the Fibre Peripheral Controller card, and press the Enter key to enable the card. If the uppermost red LED on the Fibre Peripheral Controller card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated by LD 32 on the MMI terminal connected to the Fibre Peripheral Controller card. If the LED stays on, replace the card.
- 12 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

Replacing NT5D10 68060 Call Processor (CP) Cards in systems equipped with NT5D61 IODU/C cards

Use this procedure to replace an NT5D10 68060 Call Processor (CP) card in systems equipped with NT5D61 IODU/C cards. For systems equipped with NT5D20 IOP/CMDU cards or NT6D63 IOP and NT6D64 CMDU cards, refer to “NT5D10 68060 Call Processor (CP) card” on page 45.

WARNING

Replacing the CP card in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpretation of system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.

Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module for the CP card you are replacing. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The CP card you are replacing must be in the inactive Core. Check the status of the NT5D10 Call Processor cards:

LD 135

STAT CPU determine which CP card is active

If necessary, switch Cores:

SCPU switch Cores

**** exit LD 135

- 3 Set the NORM/MAINT switch on the NT5D10 Call Processor card to MAINT on the *active* Core.
- 4 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 5 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
 - Press and hold down the MAN RST button on the CP card on the inactive Core.
 - Set the NORM/MAINT switch to MAINT.
 - Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

Installing equipment

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert the Install Program diskette which corresponds with the NT5D10 Call Processor.
- 3 Remove the current CP card and put it in a static bag and box.
- 4 Insert the CP replacement card into its vacated slot and hook the locking devices.
- 5 Press the MAN RST button on the replacement CP card.
- 6 When the NT Logo Screen appears on the terminal, press <CR>.
- 7 Enter the date and time.

- 8** When the Main Menu appears, select **<u>** to go to the Install Menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> **<u>** - To Install menu.

<t> - To Tools menu.

<q> - Quit.

Enter choice **> u**

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- 9** Insert the Keycode diskette when prompted and select **<a>** to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> **<a>** - Continue with the keycode validation

(the keycode diskette is in the floppy drive).

<q> - Quit.

Enter Choice **> a**

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10 Select the following options in sequence from the Install Menu:

- | | |
|-------------------|-------------------------------|
| <g> | to reinstall CP software |
| <y> | to start installation |
| <a> | to continue ROM upgrade |
| <cr> | to return to the Install Menu |

11 When the Install Menu appears, select the following options in sequence

- | | |
|------------------|------------------------------|
| <e> | to install CP-BOOTROM |
| <y> | to start installation |
| <a> | to continue with the upgrade |

12 A Status Summary is displayed indicating what was installed. Press **<CR>** to return to the Install Menu.

13 **Remove the diskette** from the IODU/C.

14 Select the following options to quit the Install Tool:

- | | |
|------------------|-----------------------|
| <q> | to quit |
| <y> | to confirm quit |
| <a> | to reboot the system. |

Note: The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

15 Following a successful dial tone test, perform the following basic sanity tests:

- Make sure calls can be placed
- Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

16 Press and hold down the MAN RST button on the CP card of the *inactive* Core.

17 While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.

18 Enable all CNI switches in the inactive Core.

19 Release the MAN RST button.

20 Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

21 Log into the system through the terminal, then check the status of the replacement CP card from the active side:

LD 135	load LD 135
STAT CPU	obtain the CPU status

- 22** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

TEST CPU the test causes a cold start on the inactive CPU

If the test results in:

CCED014 "Test failed because unable to enter SPLIT mode"

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

TEST CPU to test the CP card

- 23** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- 24** Check the status of the CPUs:

STAT CPU

- 25** Test the CPU.

TEST CPU

- 26** Check the status of the CNIs:

STAT CNI

- 27** Switch Cores and exit the program:

SCPU

**** exit LD 135

NT5D10 68060 Call Processor (CP) card

Use this procedure to replace an NT5D10 68060 Call Processor (CP) card in systems equipped with NT5D20 IOP/CMDU cards or NT6D63 IOP and NT6D64 CMDU cards. For systems equipped with NT5D61 IODU/C cards, refer to “Replacing NT5D10 68060 Call Processor (CP) Cards in systems equipped with NT5D61 IODU/C cards” on page 39.

WARNING

Replacing the CP card in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpretation of system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.

Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module for the CP card you are replacing. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The CP card you are replacing must be in the inactive Core. Check the status of the NT5D10 Call Processor cards:

LD 135

STAT CPU determine which CP card is active

If necessary, switch Cores:

SCPU switch Cores

******** exit LD 135

- 3 Set the NORM/MAINT switch on the NT5D10 Call Processor card to MAINT on the *active* Core.
- 4 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 5 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
 - Press and hold down the MAN RST button on the CP card on the inactive Core.
 - Set the NORM/MAINT switch to MAINT.
 - Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

Installing equipment

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert disk A1 into the IOP/CMDU or CMDU.
- 3 Remove the current CP card and put it in a static bag and box.
- 4 Ensure the NORM/MAINT switch is set to MAINT, and insert the CP replacement card into its vacated slot and hook the locking devices.
- 5 Press the MAN RST button on the replacement CP card.
- 6 Select the following options in sequence from the Install Menu:
 - <g>** to reinstall CP software
 - <y>** to start installation
 - <y>** to continue installation

<a> to continue with ROM upgrade

<cr> to return to the Install Menu

7 At the Install Menu, select the following options in sequence

<e> to install CP-BOOTROM

<y> to start installation

<y> to continue installation

<a> to continue with ROM upgrade

<cr> to return to the Install Menu

8 Remove the **diskette** from the IOP/CMDU or CMDU.

9 Select the following options to quit:

<q> to quit

<y> to confirm quit

<a> to reboot the system.

Note: The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

10 Following a successful dial tone test, perform the following basic sanity tests:

- Make sure calls can be placed
- Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

11 Press and hold down the MAN RST button on the CP card of the *inactive* Core.

12 While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.

13 Enable all CNI switches in the inactive Core.

14 Release the MAN RST button.

15 Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

16 Log into the system through the terminal, then check the status of the replacement CP card from the active side:

LD 135	load LD 135
STAT CPU	obtain the CPU status

- 17** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

TEST CPU the test causes a cold start on the inactive CPU

If the test results in:

CCED014 "Test failed because unable to enter SPLIT mode"

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

TEST CPU to test the CP card

- 18** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- 19** Check the status of the CPUs:

STAT CPU

- 20** Test the CPU.

TEST CPU

- 21** Check the status of the CNIs:

STAT CNI

- 22** Switch Cores and exit the program:

SCPU

exit LD 135

NT5D12AA Dual DTI/PRI (DDP)

Use this procedure to replace an NT5D12AA DDP card. See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

WARNING

The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

Removing the DDP card

- 1 Determine the cabinet and shelf location of the DDP card to be removed.
- 2 Disable Network Loop using Overlay 60. The command is DISL "loop number".

The associated DCHI may have to be disabled first. The faceplate switch S1 should not be disabled until both PRI loops are disabled first.
- 3 If the DDP pack is being completely removed, not replaced, remove data from memory. See the *ISDN PRI Description and Administration* NTP (553-2901-100).
- 4 Remove cross connections at the MDF to the wall-mounted cross-connect terminal.
- 5 Tag and disconnect cables from card.
- 6 Rearrange Clock Controller cables, if required.

WARNING

Do NOT route Clock Controller cables connecting the Clock Controller and DDP card through the center of the cabinet past the power harness. Instead, route them around the outside of the equipment shelves.

- 7 In the other circuit of a DDP card is in use, DO NOT remove the card.
- 8 Remove the DDP card if both loops are disabled. Switch S1 (faceplate switch) must be in the OFF (DIS) position before you remove the card.
- 9 Pack and store the DDP card and cables.

Installing the DDP card

- 1 Set the option switches on the DDP circuit pack before installation; see Table 2 below, where bold font indicates factory settings.

Table 2
DDP general purpose switch settings

Switch	Description	S9/S15 Switch Setting
1	Framing mode	off = ESF on = SF
2	Yellow alarm method	off = FDL on = Digit2
3	Zero code suppression mode	off = B8ZS on = AMI
4	Unused	off

Note: SW1 (faceplate switch) must be off (DIS) when installing the DDP. SW1 on the DDP corresponds to the faceplate switch on the QPC414 Network card.

- 2 Run and connect the DDP cables.

WARNING

Do NOT route Clock Controller cables connecting the Clock Controller and DDP card through the center of the cabinet past the power harness. Instead, route them around the outside of the equipment shelves.

- 3 Enable faceplate switch S1. This is the "Loop Enable" switch.
The faceplate LEDs should light for four seconds, then go out, and the OOS, DIS, and ACT LEDs should light again and stay lit.
If DDCH is installed, the DCH LED should flash 3 times.
- 4 Run PRI/DTI Verification Test. Refer to the *ISDN PRI Maintenance NTP* (553-2901-500).
- 5 Run PRI status check. Refer to the *ISDN PRI Maintenance NTP* (553-2901-500) for the PRI verification tests, DDP self-test, PRI status check, and PRI start-up test.

NT5D20 IOP/CMDU

Use this procedure to replace an IOP/CMDU combination unit in a:

- redundant system without disrupting call processing
- single CPU system, which requires disruption of call processing

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Replacing the IOP/CMDU in a redundant system option

Note: In redundant system options 61C and 81C, the normal procedure is to replace the faulty IOP/CMDU on the inactive Core to allow uninterrupted call processing by the active Core. The Core that is processing calls is defined as *active* and the Core not processing calls is defined as *inactive*.

- 1 Identify the faulty IOP/CMDU in the system and check if the faulty unit is in the active or inactive Core by checking the status of both CPU:

LD 135	to load the program
STAT CPU	to check CPUs status

If CPU 0 is active and the faulty IOP/CMDU is associated with inactive CPU 1, proceed with step 2. If CPU 0 is active and the faulty IOP/CMDU is associated with CPU 0, perform switchover to make CPU1 the active CPU.

Perform switchover and check the CPU status:

SCPU	to perform switchover to CPU 1
STAT CPU	to check CPUs status
****	to exit the program

Verify that the switchover to CPU1 was successful and that CPU 0 is now inactive.

- 2 Verify that disk drives in two Cores are synchronized:

LD 137	to load the program
STAT	to get the status of the two disk drives

If disk drives are synchronized, proceed with step 3. If they are not synchronized, execute the SYNC command:

SYNC	to synchronize the drives
****	to exit the program

- 3 Perform equipment data dump from the active Core (with a known good IOP/CMDU):

LD 43	load LD 43
EDD	execute datadump and wait until "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" are displayed before exiting the program
****	exit LD 43

- 4 Set the NORM/MAINT switch on the Call Processor (CP) card to MAINT on the *active* Core.

- 5 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.

- 6 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:

- Press and hold down the MAN RST button on the CP card on the inactive Core.
- While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to MAINT.
- Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

- 7 To remove the faulty IOP/CMDU and replace the data cartridge from the faulty IOP/CMDU to the replacement IOP/CMDU:

- Set the ENB/DIS switch on the faulty IOP/CMDU to DIS.
 - Remove the IOP/CMDU from its card slot in the *inactive* Core.
 - Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the IOP/CMDU.
 - Plug the above QMM42 Data Cartridge into the replacement IOP/CMDU and install the screw that secures it to the IOP/CMDU.
- 8 To install the replacement IOP/CMDU into the IOP/CMDU slot:
- Set the ENB/DIS switch on the replacement IOP/CMDU to DIS.
 - Install the IOP/CMDU into its vacant card slot and lock the locking devices by pushing them gently towards the faceplate.
 - Set the ENB/DIS switch to ENB and observe the card LED during self-test. The LED should flash three times and stay lit until the card is enabled.
- 9 Press the MAN RST button on the CP card on the inactive Core and wait until system sysloads and initializes.
- 10 Enable the IOP/CMDU and check its status:
- | | |
|-----------------|---|
| LD 137 | to load the program |
| ENL IOP | to enable the IOP part of the IOP/CMDU |
| STAT IOP | to check the status of the IOP part of the IOP/CMDU |
- 11 To update the ROM on the replacement IOP/CMDU to the software currently residing on the IOP/CMDU hard disk:
- Note:** Refer to “Software installation tool reference” in *Software conversion procedures* (553-2001-320).

- Activate the software installation tool by inserting disk A1 from the software package into the IOP/CMDU in the Core containing the replacement IOP/CMDU.
- Press the MAN RST button on the CP card in the Core containing the replacement IOP/CMDU.
- Select the following options in sequence:
 - <f> to install ROM on the IOP part of the IOP/CMDU only
 - <y> to start installation
- Specify software installation from the hard disk and follow screen directions until the install menu returns.
- Remove the disk from the IOP/CMDU.
- Select the following options to quit and reboot the system:
 - <q> to quit
 - <y> to confirm quit
 - <a> to reboot the system

12 Test the replacement IOP/CMDU:

LD 137	to load the program
DIS IOP	to disable the IOP part of the IOP/CMDU
TEST IOP	to test the operation of the IOP part of the IOP/CMDU
ENL IOP	to enable the IOP part of the IOP/CMDU
TEST CMDU n	to test the operation of the CMDU part of the IOP/CMDU where n is the inactive Core IOP/CMDU

If there is a problem, a CIOD system message is generated.

- 13** To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following three steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced IOP/CMDU):
- Press and hold down the MAN RST button on the CP card of the *inactive* Core.

- While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.
- Release the MAN RST button.

After several minutes, an "HWI533" message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

- 14 Set the ENB/DIS switch on all CNI cards in the *inactive* Core to ENB.

- 15 Synchronize the disk drives of the two Cores:

LD 137	to load the program
STAT	to get status of both IOP/CMDUs
SYNC	to synchronize the drives
****	to exit the program

- 16 Verify CPU redundancy and CNI operation:

LD 135	to load the program
STAT CPU	to get status of both CPUs
STAT CNI	to verify the operation of all CNI cards

- 17 Place the *active* CPU in the normal mode by setting the NORM/MAINT switch on the CP card to NORM.

- 18 Check the CPUs and switch the call processing to the currently *inactive* CPU:

LD 135	to load the program
STAT CPU	to get status of both CPUs
SCPU	to switch to currently inactive CPU and make it active
STAT CPU	to check the status of both CPUs again to verify that the switchover occurred
****	to exit the program

- 19 Check the status of the replacement IOP/CMDU in the *active* Core and make sure it is operating correctly:

LD 137	to load the program
STAT	to get status of both IOP/CMDUs
DIS IOP	to disable the IOP part of the IOP/CMDU in the active Core
TEST IOP	to verify the operation of the IOP part of the IOP/CMDU in the active Core (replacement IOP/CMDU)
ENL IOP	to enable the IOP part of the IOP/CMDU after the test
TEST CMDU n	to test the operation of the CMDU part of the IOP/CMDU
****	to exit the program

- 20 Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing the IOP/CMDU in a single CPU system option

Note: In a single CPU system option, i.e. option 51C, replacing the faulty IOP/CMDU will disrupt call processing.

- 1 Check the status of the IOP/CMDU:

LD 137	to load the program
STAT	to get the status of the IOP/CMDU
****	to exit the program
- 2 Perform equipment data dump if possible. If the IOP/CMDU is faulty, a successful data dump may not be possible:

LD 43	load LD 43
EDD	execute datadump and wait until "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" are displayed before exiting the program.
****	exit LD 43

3 Disable the IOP portion of the IOP/CMDU:

LD 137	load LD 137
DIS IOP	Disable the IOP.

4 To remove the faulty IOP/CMDU and replace the data cartridge from the faulty IOP/CMDU to the replacement IOP/CMDU:

- Set the ENB/DIS switch on the faulty IOP/CMDU to DIS.
- Remove the IOP/CMDU.
- Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the IOP/CMDU.
- Plug the above QMM42 Data Cartridge into the replacement IOP/CMDU and install the screw that secures it to the IOP/CMDU.

5 Installing the replacement IOP/CMDU into the IOP/CMDU slot:

- Set the ENB/DIS switch on the replacement IOP/CMDU to DIS.
- Install the IOP/CMDU into its vacant card slot and lock the locking devices by pushing them gently towards the faceplate.
- Set the ENB/DIS switch to ENB and observe the card LED during self-test. The LED should flash three times and stay lit until the card is software enabled.

6 Enable the IOP/CMDU and test its operation:

LD 137	to load the program
ENL IOP	to enable the IOP part of the IOP/CMDU
STAT IOP	to check the status of the IOP part of the IOP/CMDU
****	exit LD 137

- 7 Perform equipment data dump again if the previous attempt (in step 2) was not successful. With the replacement IOP/CMDU, successful data dump should be obtained:

LD 43	load LD 43
EDD	execute datadump and wait until "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" are displayed before exiting the program.
****	exit LD 43

- 8 *The following procedure will disrupt the call processing.* To update the ROM on the replacement IOP/CMDU to the software currently residing on the IOP/CMDU hard disk, perform the following steps:

Note: . Refer to "Software installation tool reference" in *Software conversion procedures* (553-2001-320).

- Activate the software installation tool by inserting disk A1 from the software package into the IOP/CMDU.
- Press the MAN RST button on the CP card.
- Select the following options in sequence:

<f>	to install ROM only on the IOP part of the IOP/CMDU
<y>	to start installation
- Specify software installation from the hard disk and follow screen directions until the install menu returns.
- Remove the disk from the IOP/CMDU.
- Select the following options to quit and reboot the system:

<q>	to quit
<y>	to confirm quit
<a>	to reboot the system

9 Test the replacement IOP/CMDU:

LD 137	to load the program
DIS IOP	to disable the IOP part of the IOP/CMDU
TEST IOP	to test the operation of the IOP part of the IOP/CMDU
ENL IOP	to enable the IOP part of the IOP/CMDU
TEST CMDU	to test the CMDU part of the IOP/CMDU
****	exit LD 137

If there is a problem, a CIOD system message is generated.

- 10** Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing the NT6D63 IOP and the NT6D64 CMDU with the NT5D20 IOP/CMDU

Use this procedure to replace a NT6D63 I/O Processor and a NT6D64 CMDU with an NT5D20 IOP/CMDU combination unit. This procedure is used when an IOP or a CMDU is faulty and you have to replace both the IOP and the CMDU with an IOP/CMDU. The replacement procedure differs for a:

- redundant system without disrupting call processing
- single CPU system, which requires disruption of call processing

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Replacing the IOP and the CMDU with the IOP/CMDU in a redundant system option

Note: In redundant system options 61C and 81C, the normal procedure is to replace the faulty IOP and CMDU on the inactive Core to allow uninterrupted call processing by the active Core. The Core that is processing calls is defined as *active* and the Core not processing calls is defined as *inactive*.

- 1 Identify the faulty IOP or CMDU in the system and check if the faulty unit is in the active or inactive Core by checking the status of both CPUs:

LD 135	to load the program
STAT CPU	to check CPUs status

If CPU 0 is active and the faulty IOP or CMDU is associated with inactive CPU 1, proceed with step 2. If CPU 0 is active and the faulty IOP or CMDU is associated with CPU 0, perform switchover to make CPU1 the active CPU.

Perform switchover and check the CPU status:

SCPU	to perform switchover to CPU 1
STAT CPU	to check CPUs status
****	to exit the program

Verify that the switchover to CPU1 was successful and that CPU 0 is now inactive.

- 2 Verify that disk drives in two Cores are synchronized:

LD 137	to load the program
STAT	to get the status of the two disk drives

If disk drives are synchronized, proceed with step 3. If they are not synchronized, execute the SYNC command:

SYNC	to synchronize the drives
****	to exit the program

- 3 Perform equipment data dump from the active Core (with a known good IOP and CMDU):

LD 43	load LD 43
EDD	execute datadump and wait until "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" are displayed before exiting the program.
****	exit LD 43

- 4 Set the NORM/MAINT switch on the Call Processor (CP) card to MAINT on the *active* Core.
- 5 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 6 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
 - Press and hold down the MAN RST button on the CP card on the inactive Core.
 - While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to MAINT.
 - Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

- 7 To remove the faulty IOP and replace the data cartridge from the faulty IOP to the replacement IOP/CMDU:
 - Set the ENB/DIS switch on the faulty IOP to DIS.
 - Remove the IOP from its card slot in the *inactive* Core.
 - Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the IOP.
 - Plug the above QMM42 Data Cartridge into the replacement IOP/CMDU and install the screw that secures it to the IOP/CMDU.

8 To remove the faulty CMDU:

- If there is a floppy disk in the CMDU you are replacing, remove the floppy disk.
- Set the power switch on the front of the CMDU to OFF (down).
- Wait at least 10 seconds, then unhook the locking devices on the CMDU and gently pull the unit out of the card cage. To install the replacement IOP/CMDU into the IOP/CMDU slot:
- Set the ENB/DIS switch on the replacement IOP/CMDU to DIS.
- Install the IOP/CMDU into slots 17, 18, and 19 in the NT5D21 Core/Network Module or slots 16, 17, and 18 in the NT9D11 Core/Network Module and NT6D60 Core Module. Lock the locking devices by pushing them gently towards the faceplate.
- Set the ENB/DIS switch to ENB and observe the card LED during self-test. The LED should flash three times and stay lit until the card is enabled.

9 To update the software on the CMDU and the ROM on the replacement IOP/CMDU to the software currently residing on the active CMDU hard disk:

Note: Refer to “Software installation tool reference” in *Software conversion procedures* (553-2001-320).

- Activate the software installation tool by inserting disk A1 from the software package into the IOP/CMDU in the Core containing the replacement IOP/CMDU.
- Press the MAN RST button on the CP card in the Core containing the replacement IOP/CMDU.
- Select the following options in sequence:
 - <c> to install software only
 - <f> to install ROM on the IOP part of the IOP/CMDU only
 - <y> to start installation

- Specify software installation from the hard disk and follow screen directions until the install menu returns.
- Remove the disk from the IOP/CMDU.
- Select the following options to quit and reboot the system:

<q>	to quit
<y>	to confirm quit
<a>	to reboot the system

The system will load the software.

Wait until the system sysloads and initializes.

10 Test the replacement IOP/CMDU:

LD 137	to load the program
DIS IOP	to disable the IOP part of the IOP/CMDU
TEST IOP	to test the operation of the IOP part of the IOP/CMDU
ENL IOP	to enable the IOP part of the IOP/CMDU
TEST CMDU n	to test the operation of the CMDU part of the IOP/CMDU where n is the inactive Core IOP/CMDU

If there is a problem, a CIOD system message is generated.

11 To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following three steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced IOP/CMDU):

- Press and hold down the MAN RST button on the CP card of the *inactive* Core.
- While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.
- Release the MAN RST button.

After several minutes, an "HWI533" message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

12 Set the ENB/DIS switch on all CNI cards in the *inactive* Core to ENB.

13 Synchronize the disk drives of the two Cores:

LD 137	to load the program
STAT	to get status of both the replacement IOP/CMDUs and the IOP and CMDU (or IOP/CMDU) in the other Core
SYNC	to synchronize the drives
****	to exit the program

14 Verify CPU redundancy and CNI operation:

LD 135	to load the program
STAT CPU	to get status of both CPUs
STAT CNI	to verify the operation of all CNI cards

15 Place the *active* CPU in the normal mode by setting the NORM/MAINT switch on the CP card to NORM.

- 16** Check the CPUs and switch the call processing to the currently *inactive* CPU:

LD 135	to load the program
STAT CPU	to get status of both CPUs
SCPU	to switch to currently inactive CPU and make it active
STAT CPU	to check the status of both CPUs again to verify that the switchover occurred
****	to exit the program

- 17** Check the status of the replacement IOP/CMDU in the *active* Core and make sure it is operating correctly:

LD 137	to load the program
STAT	to get status of both IOP/CMDUs
DIS IOP	to disable the IOP part of the IOP/CMDU in the active Core
TEST IOP	to verify the operation of the IOP part of the IOP/CMDU in the active Core (replacement IOP/CMDU)
ENL IOP	to enable the IOP part of the IOP/CMDU after the test
TEST CMDU n	to test the operation of the CMDU part of the IOP/CMDU
****	to exit the program

- 18** Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing the IOP and the CMDU with the IOP/CMDU in a single CPU system option

Note: In a single CPU system option, i.e. option 51C, replacing a faulty IOP or a CMDU with an IOP/CMDU will disrupt call processing.

1 Check the status of the IOP and the CMDU:

LD 137	to load the program
STAT	to get the status of the IOP and the CMDU
****	to exit the program

2 Perform equipment data dump if possible. If the IOP or the CMDU is faulty, a successful data dump may not be possible:

LD 43	load LD 43
EDD	execute datadump and wait until "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" are displayed before exiting the program.
****	exit LD 43

3 Disable the IOP:

LD 137	load LD 137
DIS IOP	Disable the IOP.

4 To remove the faulty IOP and replace the data cartridge from the faulty IOP to the replacement IOP/CMDU:

- Set the ENB/DIS switch on the faulty IOP to DIS.
- Remove the IOP.
- Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the IOP.
- Plug the above QMM42 Data Cartridge into the replacement IOP/CMDU and install the screw that secures it to the IOP/CMDU.

- 5 To remove the faulty CMDU:
 - If there is a floppy disk in the CMDU you are replacing, remove the floppy disk.
 - Set the power switch on the front of the CMDU, if present, to OFF (down).
 - Wait at least 10 seconds, then unhook the locking devices on the CMDU and gently pull the unit out of the card cage.
- 6 Installing the replacement IOP/CMDU into the IOP/CMDU slot:
 - Set the ENB/DIS switch on the replacement IOP/CMDU to DIS.
 - Install the IOP/CMDU into slots 17, 18, and 19 in the NT5D21 Core/Network Module or slots 16, 17, and 18 in the NT9D11 Core/Network Module and NT6D60 Core Module. Lock the locking devices by pushing them gently towards the faceplate.
 - Set the ENB/DIS switch to ENB and observe the card LED during self-test. The LED should flash three times and stay lit until the card is software enabled.
- 7 Enable the IOP/CMDU and test its operation:

LD 137

to load the program

ENL IOP

to enable the IOP part of the IOP/CMDU

STAT IOP

to check the status of the IOP part of the IOP/CMDU

exit LD 137
- 8 Perform equipment data dump again if the previous attempt (in step 2) was not successful. With the replacement IOP/CMDU, successful data dump should be obtained:

LD 43

load LD 43

EDD

execute datadump and wait until
"DATADUMP COMPLETE" and
"DATABASE BACKUP COMPLETE" are
displayed before exiting the program.

exit LD 43

- 9 *The following procedure will disrupt the call processing.* To update the software and the ROM on the replacement IOP/CMDU to the software currently residing on the IOP/CMDU hard disk, perform the following steps:

Note: . Refer to “Software installation tool reference” in *Software conversion procedures* (553-2001-320).

- Activate the software installation tool by inserting disk A1 from the software package into the IOP/CMDU.
- Press the MAN RST button on the CP card.
- Select the following options in sequence:
 - <c> to install software only
 - <f> to install ROM only on the IOP part of the IOP/CMDU
 - <y> to start installation
- Specify software installation from the hard disk and follow screen directions until the install menu returns.
- Remove the disk from the IOP/CMDU.
- Select the following options to quit and reboot the system:
 - <q> to quit
 - <y> to confirm quit
 - <a> to reboot the system

10 Test the replacement IOP/CMDU:

LD 137	to load the program
DIS IOP	to disable the IOP part of the IOP/CMDU
TEST IOP	to test the operation of the IOP part of the IOP/CMDU
ENL IOP	to enable the IOP part of the IOP/CMDU
TEST CMDU	to test the CMDU part of the IOP/CMDU
****	exit LD 137

If there is a problem, a CIOD system message is generated.

11 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT5D30AA Dual InterGroup Switch (DIGS) card

Use this procedure to replace two QPC412 Intergroup Switch (IGS) cards with one new NT5D30 Dual Intergroup Switch (DIGS) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 System message guide* for interpreting system messages.

WARNING

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Before removing the IGS cards, the associated CPU must be inactive. For example, if CPU 0 is active, any odd numbered IGS cards are replaceable without switching CPUs. Refer to Table 3 for IGS card locations.

Table 3

Network Group 0	Shelf 0	IGS 0 & 2
	Shelf 1	IGS 1 & 3
Network Group 1	Shelf 0	IGS 4 & 6
	Shelf 1	IGS 5 & 7
Network Group 2	Shelf 0	IGS 8 & 10
	Shelf 1	IGS 9 & 11
Network Group 3	Shelf 0	IGS 12 & 14
	Shelf 1	IGS 13 & 15
Network Group 4	Shelf 0	IGS 16 & 18
	Shelf 1	IGS 17 & 19

- 2 If you need to switch CPUs:

LD 135 to load the program

STAT CPU to verify CPU status

SCPU to switch CPUs (if necessary)

******** to exit

- 3 Check the clock status:

LD 60

SSCK x (x= 0 or 1)

The associated clock must be in STANDBY. If you need to switch clocks:

SWCK (if needed)

Note: Even numbered IGS cards are associated with clock 0. Odd numbered IGS cards are associated with clock 1.

- 4 Software disable the IGS card:

LD 39

DISI IGS xx ("xx" refers to IGS card number 0-19)

ISR043 appears on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

- 5 Software disable the second IGS card:

DISI IGS xx ("xx" refers to IGS card number 0-19)

ISR043 appears on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

- 6 Faceplate disable the IGS cards.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 7 Tag and disconnect cables 0 and 1 to the card you are removing.
- 8 Unlock the locking devices on the cards; pull them out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the NT5D30 DIGS card.
- 2 Insert the DIGS card:

WARNING

Insertion of the DIGS cards in the incorrect slot will have an effect on system performance.

- For NT8D35 Network modules, insert the DIGS card into slot 2
- For NT5D21 Core/Net modules, insert the DIGS card into slot 9
- For QSD39 Network shelves, insert the DIGS card into slot 13
- For QSD40 Network shelves, insert the DIGS card into slot 2

- 3 Connect tagged cables 0 and 1 to the replacement card.
- 4 Set the ENB/DIS switch to ENB on the new card.
- 5 Software enable the DIGS card in LD 39

ENL IGS xx

STAT IGS

- When the process is complete, you will receive a system response.
- If there is a problem, an ISR system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 39:

- 6 Test the DIGS card:

LD 45

NSIG

- If there is a problem, a CED system message is generated.

**** to exit

- 7 Switch clocks to the SCG (System Clock Generator)

LD 39

SCLK to switch the clock

**** to exit

The DIGS card replacement procedure is complete.

NT6D3903 CPU/Network Module Card Cage

To replace a defective backplane in an NT6D39 CPU/Network Module, you must replace the card cage. Use this procedure to replace the CPU/Network Module card cage.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

1 Disable the CPU:

- In a single-CPU system, set the ENB/DIS switch to DIS on the QPC580 CPU Interface (IF) Card. This will stop call processing.
- In a dual-CPU system, the CPU on the backplane you are replacing must be inactive:

If you need to switch CPUs:

LD 35

TCPU	test CPU
SCPU	switch CPU
****	exit LD 35

Set the NORM/MAINT switch to MAINT on the *active* CPU interface (IF) card. (This keeps the system from switching to the inactive CPU.)

Set the ENB/DIS switch to DIS on the *inactive* interface card.

2 Software disable network equipment cards:

- Disable all network loops on the shelf by disabling the peripheral signaling card:

LD 32**DSPS x**

Table 4 lists the loops represented by "x"
exit LD 32

- Disable all other cards that might be in the module, such as serial data interface (SDI) cards or primary rate interface (PRI) cards.

CAUTION

If the system terminal is assigned to an SDI that will be disabled, assign it to another port before the SDI is disabled.

Table 4
Network loop codes

Group/ shelf	Peripheral signaling card	Loops disabled/enabled			
0 / 0	0	0	—	15	
0 / 1	1	16	—	31	

- 3** If the multi disk unit (MDU) or floppy disk unit (FDU) is located in the module, unseat disks from the disk drives. (In an option 61, move the MDU or FDU to the active CPU module.)
- 4** Turn off power to the column or the module power supply:
 - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D41 CE Power Supply to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)
- 5 Remove the NT8D22 System Monitor in the rear of the pedestal. (Do *not* turn off the blower unit in the front of the pedestal.)

Note: If this is the master system monitor, disconnect the RJ11 cables before you pull the system monitor out of the pedestal.

CAUTION

If the system monitor is not removed, the system may shut down.

- 6 Remove all cards from the module:
- Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
- 7 Disconnect cables, plugs, and wires from the rear of the module to the backplane:
- Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 8 Remove the two mounting screws that secure the rear of the card cage to the module.
- 9 Remove the front cover plates on both sides of the card cage.
- 10 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

Installing equipment

- 1** Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2** Replace the front cover plates on both sides of the card cage.
- 3** Install the mounting screws at the rear of the card cage.
- 4** Reconnect cables, plugs, and wires to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Connect all plugs, wires, and cables to the backplane.
 - Position the I/O safety panel. Tighten the screws.
- 5** Return cards to their slots. Reconnect all cables to connectors.
- 6** Reinstall the system monitor. If this is the master system monitor, reconnect the RJ11 cables after it is installed.
- 7** Turn on power to the column or the module power supply:
 - With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply in the module.
- 8** If the MDU or FDU is in the module, reinsert disks into the drive.
- 9** Enable the CPU:
 - Set the ENB/DIS switch to ENB on the inactive interface card.
 - In a dual-CPU system, set the NORM/MAINT switch to NORM on both interface cards.

10 Software enable network equipment cards:

- Enable the peripheral signaling card:

LD 32

ENPS x

exit LD 32

- Enable any other disabled cards.

11 Test network loops:

LD 30

LOOP ALL

If there is a problem, an NWS system message is generated.

If there is no problem, exit LD 30:

12 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT6D40, NT6D41, NT6D42, NT6D43 Power Supply DC

Use this procedure to replace the following DC power supplies:

- NT5K12 Enhanced Peripheral Equipment (EEPE) Power Supply DC
- NT6D40 PE Supply DC
- NT6D41 CE Power Supply DC
- NT6D42 Ringing Generator DC
- NT6D43 CE/PE Power Supply DC

CAUTION

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Set the switch on the front of the power supply to OFF (down).
- 2 Unhook the locking devices on the power supply; pull it out of the card cage.

Installing equipment

- 1 Set the switch on the replacement power supply to OFF (down).

Note: On a replacement NT6D42 or NT6D43, set option switches the same as on the one you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

- 2 Insert the replacement power supply into the vacated slot and hook the locking devices.
- 3 Set the switch on the replacement power supply to ON (up). The green LED on the power supply should light and stay lit.
- 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT5D61 Input/Output Disk Unit with CD-ROM (IODU/C)

Use this procedure to replace a faulty IODU/C card with a new IODU/C card.

WARNING

Performing this procedure in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system will warm start, causing a momentary interruption in call processing.

Performing a data dump

Before starting this procedure, make a backup copy of the customer database on a 4MB diskette using the data dump routine:

- 1 Log into the system
- 2 Load the Equipment Data Dump Program (LD 43). At the prompt, enter
LD 43 to load the program
- 3 When "EDD000" appears on the terminal, enter
EDD to begin the data dump

- 4 When "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" appear on the terminal, enter
**** to exit the program

CAUTION

If the data dump is not successful, do not continue; contact your technical support organization. A data dump problem must be corrected before proceeding.

To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the *inactive* Core Module or Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

Splitting the Cores

- 1 Verify that the disk drives are synchronized:

LD 137 to load the program

STAT to get the status of the disk drives

If the disks are synchronized, proceed with step 2. If they are not synchronized, execute the **SYNC** command:

SYNC to synchronize the drives

**** to exit the program

- 2 Verify that the clock controller associated with the faulty IODU/C is *inactive*. If it is not, switch clock controllers:

LD 60 to load the program

SSCK to get the status of the clock controllers

SWCK to switch clock controllers (if necessary)

**** to exit the program

- 3 Verify that the IODU/C card you are replacing is on the *inactive* Core:

LD 135 to load the program
STAT CPU to check CPU status
TEST CPU to test the CPU

If the IODU/C you are replacing is on the *inactive* Core, proceed with step 5. If the IODU/C you are replacing is not on the *inactive* Core, swap Cores and verify again:

SCPU to swap CPUs
STAT CPU to check CPU status

- 4 Verify that the faulty IODU/C is *inactive*. You may need to switch IODU/Cs.

LD 137
STAT Get the status of IODU/C.
SWAP Switch IODU/Cs (if necessary).

- 5 Set the MAINT/NORM switch on the CP card to MAINT on the *active* Core.

- 6 Set the ENB/DIS switch on all CNI cards to DIS on the *inactive* Core.

- 7 Perform the following three steps in uninterrupted sequence:

- press and hold the MAN RST button on the CP card in the *inactive* Core
- set the MAINT/NORM switch on the CP card in the *inactive* Core to MAINT
- release the MAN RST button

Replacing the IODU/C in a redundant system

- 1 Set the ENB/DIS switch on the faulty IODU/C to DIS.
- 2 Unhook the locking devices and remove the IODU/C.
- 3 Remove the round 1/2" diameter IODU/C Security Device from the black round Security Device holder on the top right corner of the IODU/C card being replaced.
- 4 Put the IODU/C being replaced into a static bag and box.
- 5 With the Nortel side facing upward, slide the Security Device between the security device holder and the holder clip in the new IODU/C card. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 6 Insert the new IODU/C into the following slots:
 - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17,18, and 19.
 - For NT9D11 Core/Network Modules and NT6D60 Core Modules, insert the IODU/C into slots 16, 17, and 18.
- 7 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.
- 8 Press the MAN RST button on the CP card.

Once the keycode is validated against the Security Device, the Install menu is displayed.

9 At the Install menu, select <o> to copy the software from the active Core.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<o> - To copy System Software from the other Core.
<t> - To go to the Tools menu.
<k> - To install Keycode only.

For Feature Expansion, use OVL143.

<q> - Quit.

553-7784

Enter choice > o

10 Select <a> to confirm.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You selected to copy the hard disk /p partition from IODU on Core 1 to IODU on Core 0.

60 MB of disk will be copied.

This will erase old system files, Database files will NOT be erased.

Note that ERASED FILES CANNOT BE RECOVERED.

NOTE: Copy progress will be indicated by ... , one '!' per MB.

You may Continue with the copy operation or Quit now and leave your system unchanged.

Please enter:

<CR>--> <a> -Copy /p partition from one Core 1 to Core 0.

<q> - Quit.

Enter Choice > a

553-7739

11 Select <a> to confirm the software release to be copied.

12 When the software is installed successfully, press <CR> to install CP-software from the hard disk to Flash EEPROM, and install CP-BOOT ROM. Follow the screen directions until the Main Menu returns.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Release: xxxx was installed successfully into /p partition on your side

NOTE: In order to complete the install you must install flash ROM

In order to complete the install you must install CP BOOT ROM

Please press <CR> when ready...

553-7741

13 When the Main Menu returns, select <f> to install IOP-ROM.

14 Select <a> to continue with the IOP-ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDRom INSTALL Tool (x11)

You have chosen to Upgrade IOP-ROM in card slot xx from
the context: x11xxxx to the context: x11xxxx.

This will replace old IOP-ROM with the ROM image files:
"/p/os/ioprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter choice > a

553-7787

15 At the Install Menu, select the following options in sequence to copy the
customer database from the redundant disk.

- | | |
|-----|--|
| <d> | to go to the Database menu |
| <d> | to copy the database from the redundant disk |
| <y> | to confirm installation status summary |
| <a> | to confirm database copy |

- 16 Remove the diskette** from the IODU/C and select <q> to quit and reload the system.
- 17 Select <y>** to confirm quit
- 18 Select <a>** to reboot the system.

The system will automatically perform a sysload and system initialization during which several messages will appear on the system terminal. Wait until initialization has finished (INI messages are no longer displayed on the system terminal) before continuing.

- 19 In the inactive Core**, enable the NT6D65 CNI cards by setting the ENB/DIS faceplate switches to ENB.
- 20 In the inactive Core**, perform the following steps in uninterrupted sequence:

- press and release the MAN RST button
- when SYS700 messages appear on CP LCD display, set the MAINT/NORM switch to NORM.

Within 60 seconds, the LCD will display the following messages, confirming the process.

RUNNING ROM OS ENTERING CP VOTE

An "HWI534" message from the CPSI or SDI port indicates the start of memory synchronization. Within 10 minutes, an HWI533 message on the *inactive* Core CPSI or SDI TTY indicates the memory synchronization is taking place. Wait until the memory synchronization is complete.

- 21 Switch the NORM/MAINT switch on the active CP card to NORM.**
- 22 Synchronize the disk drives:**

LD 137	to load the program
SYNC	to synchronize the drives
****	to exit the program

Note: Synchronization may take up to 50 minutes.

Replacing the IODU/C in an option 51C

- 1 Perform a data dump in LD 43 (if possible).
- 1 Set the ENB/DIS switch on the faulty IODU/C to DIS.
- 2 Unhook the locking devices and remove the IODU/C.
- 3 Remove the round 1/2" diameter IODU/C Security Device from the black round Security Device holder on the top right corner of the IODU/C card being replaced.
- 4 Put the IODU/C being replaced into a static bag and box.
- 5 With the Nortel side facing upward, slide the Security Device between the security device holder and the holder clip in the new IODU/C card. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 6 Insert the new IODU/C into the following slots:
 - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17,18, and 19.
 - For NT9D11 Core/Network Modules and NT6D60 Core Modules, insert the IODU/C into slots 16, 17, and 18.
- 7 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.
- 8 Activate the software installation tool by inserting the Install disk from the software package into the IODU/C.
- 9 Press the MAN RST button on the CP card in the Core containing the replacement IODU/C.

10 At the Main Menu select **<u>** to go to the Install Menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> **<u>** - To Install menu.

<t> - To Tools menu.

<q> - Quit.

Enter choice **> u**

553-7780

11 Insert the Keycode diskette when prompted and select **<a>** to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> **<a>** - Continue with the keycode validation

(the keycode diskette is in the floppy drive).

<q> - Quit.

Enter Choice **> a**

553-7729

Once the keycode is validated against the Security Device, the Install menu is displayed.

- 12** At the Install menu, select **** to install software, database, CP-BOOTROM, and IOP-ROM.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

- <CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
 <c> - To install Software only.
 <d> - To install Database only.
 <e> - To install CP-BOOTROM only.
 <f> - To install IOP-ROM only.
 <g> - To reinstall CP-Software.
 <o> - To copy System Software from the other Core.
 <t> - To go to the Tools menu.
 <k> - To install Keycode only.
 For Feature Expansion, use OVL143.
 <q> - Quit.

553-7783

Enter choice > **b**

The Install Tool displays the software release to be installed and prompts you to confirm that the CD-ROM containing the software has been inserted.

13 Select **<a>** to continue with the software upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Install Utility will install x1123xx software for s/w for software generic xxxx
(Call Processor, System Type) on your system.
Please insert the installation CDROM into the drive on Core 1.

The labeled side of the CDROM should be side up in the CDROM tray.

Please enter:

<CR>--> <a> - CDROM is now in drive.

Continue with installation.

<q> - Quit.

Enter Choice > **a**

553-7732

- 14 A Status Summary is displayed indicating what will be installed. Select <y> to confirm the start of installation.

INSTALLATION STATUS SUMMARY

Option	Choice	Status	Comment
SW: CD to disk	yes		from xxxx to xxxx
SW: disk to ROM	yes		
Database	yes		
CP-BOOTROM	yes		
IOP-ROM	yes		

Please enter:

<CR> -> <y> - Yes, start Installation.

<n> - No, stop Installation. Return to the Main Menu.

Enter Choice> y

553-7731

The terminal displays information about the software upgrade.

15 Select **<a>** to continue with software installation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You selected to upgrade the system from release: xxxx to release: xxxx.

This will erase all old system files.

Database files will NOT be erased. You may continue installing the software or quit now and leave your system unchanged.

Please enter:

<CR>--> <a> - Continue with Upgrade.

<q> - Quit.

Enter Choice > **a**

553-7733

16 Select **<a>** to confirm the software release to be installed.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

Upgrading from release xxxx to release xxxx

Please enter:

<CR>--> <a> - Continue with upgrade.

<q> - Quit.

Enter choice > **a**

553-7740

17 Select **<a>** to continue with the ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade CP-software in card slot xx from the context: x11xxxx to the context: x11xxxx.

This will replace old CP-software with the ROM image files:
"/p/os/flashos,/p/sl1/sl1res,/p/sl1/ovlres,/p/os/flashfs".

You may Continue with ROM upgrade or Quit now and leave ROM unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter Choice > a

553-7734

18 At the Database Menu, insert the first 2MB Database diskette in the IODU/C.

19 Select **<a>** to install the customer database.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You will now perform the database installation.

Note: If you are installing the Database from a floppy disk,
please insert the correct disk now.

Please enter:

<CR>--> <a> - Install CUSTOMER Database

(the customer database diskette must be in the Core 1 disk drive).

 - Install DEFAULT Database

(the installation CDROM must be in the Core 1 disk drive).

<d> - Copy Database from the redundant disk.

<e> - Check the Database that exists on the hard disk.

<q> - Quit.

Enter Choice > **a**

553-7779

20 Follow all screen instructions regarding insertion of any additional Database diskettes.

21 Select <a> to continue with the CP-BOOTROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade CP-BOOTROM in card slot xx from
the context: xxxxx to the context: xxxxx.

This will replace old CP-BOOTROM with the ROM image files:
"/p/os/cprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter Choice > **a**

553-7738

22 Select <y> to begin installation of IOP-ROM upgrade.

23 Select <a> to continue with the IOP-ROM upgrade

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade IOP-ROM in card slot xx from
the context: x11xxxx to the context: x11xxxx.

This will replace old IOP-ROM with the ROM image files:
"/p/os/ioprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter choice > **a**

553-7787

24 Select <q> to quit and reload the system.

25 **Remove the diskette** from the IODU/C.

26 Select <y> to confirm quit.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You selected to Quit. Please confirm.

Please enter:

<CR>--> <y> - Yes, Quit.

<n> - No, DO NOT Quit.

Enter choice > **y**

553-7751

27 Select <a> to reboot the system.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You have selected to Quit the Software Installation Tool
You may reboot the system or return to the Main Menu.
Before rebooting the system, remove Install diskette from the floppy drive.

DO NOT REBOOT USING BUTTON!!

Please enter:

<a> - Reboot the system.

<CR>--> <m> - Return to the Main menu.

Enter Choice > a

553-7752

The system will automatically perform a sysload and system initialization during which several messages will appear on the system terminal. Wait until initialization has finished (INI messages are no longer displayed on the system terminal) before continuing.

28 Verify that the "DONE" message appears on the system terminal.

Note: The SYSTEM INI message may take 70 seconds or more to appear.

Completing the upgrade

To complete the IODU/C card upgrade, verify CPU and CNI status.

- 1 Log into the system.
- 2 Verify CPU and CNI functionality:
 - LD 135** to load the overlay
 - STAT CPU** to check the CPU status
 - STAT CNI** to verify CNI functionality
 - ****** to exit the program
- 3 Load the Equipment Data Dump Program (LD 43). At the prompt, enter
 - LD 43** to load the program
- 4 When “EDD000” appears on the terminal, enter
 - EDD** to begin the data dump
- 5 When “DATADUMP COMPLETE” and “DATABASE BACKUP COMPLETE” appear on the terminal, enter
 - ****** to exit the program
- 6 Evaluate the number of call registers and telephone buffers that are configured for the system. Refer to *Meridian 1 capacity engineering* (553-3001-149).

The IODU/C card upgrade is complete.

NT6D52 Rectifier –48 V/30 A

Use this procedure to replace the NT6D52 Rectifier.

Removing equipment

- 1 Make sure power to the system is completely shut down by first placing all breakers on all Meridian 1 columns to OFF and then placing the AC BRKR switches on all rectifiers to OFF. This includes the AC BRKR switches on other rectifiers that may be connected to the system through another QBL15 Power Distribution Box (see Figure 11 on page 105).
- 2 Unplug the AC power plug of the rectifier being replaced from its AC receptacle and remove any plastic cable ties that might be securing this power cord to the rack.
- 3 Remove the rear cover from the rectifier.
- 4 Tag and disconnect all wiring from TB3 and TB4 on the rear panel of the rectifier.
- 5 Unscrew the nut from the conduit fitting (located below TB3) and carefully remove the fitting and wires from the rectifier.
- 6 Remove the two sheet metal screws that secure the baffle assembly to the bottom of the rectifier.
- 7 Remove the rack mounting screws that secure the rectifier in the rack, and lift the rectifier out of the rack.
- 8 Tag the defective rectifier with a description of the failure symptoms and package it for return to a repair center.

Installing equipment

- 1 Position the replacement rectifier in the rack. Replace the rack mounting screws and the two sheet metal screws that secure the baffle assembly to the bottom of the rectifier.
- 2 Remove the rear cover from the replacement rectifier.
- 3 Remove the conduit fitting that is installed below TB3 in the replacement rectifier; it will not be used.

- 4 Remove the switch locking bracket from the 220 V/110 V switch (SW1 on the front of the rectifier) and set the switch to match the commercial power source. Make sure the bracket is properly reinstalled to prevent the switch from being operated.
- 5 Remove the safety shield from TB3.
- 6 Carefully insert the wires and conduit fitting from the QBL15 into the hole below TB3 and secure the fitting to the chassis with a nut.
- 7 Reconnect the wiring from the QBL15 to the rectifier as follows (see Figure 11):
 - Connect the #4 AWG black wire to terminal 2 on TB3 (48 V return).
 - Connect the #4 AWG red wire to terminal 1 on TB3 (– 48 V).
 - **For systems without battery backup:**
 - Make sure that the two factory-installed jumpers are properly connected to TB4, one from + OUT to +SENS and the other from – OUT to – SENS.
 - **For systems with battery backup:**
 - Remove all jumpers from TB4; they will not be used.
 - Connect the #22 AWG black wire to the + SENS terminal on TB4.
 - Connect the #22 AWG red wire to the – SENS terminal on TB4.
 - Connect the #22 AWG blue wire to the DCON terminal on TB4.

CAUTION

Incorrect wiring connections between a rectifier and the QBL15 can cause serious system damage. Refer to Figure 11 and verify that all wiring is properly connected before proceeding.

- 8 Reinstall the safety shield on TB3 and then install the rear cover on the rectifier.
- 9 Make sure the AC BRKR switch on the rectifier is OFF.
- 10 Plug the AC power plug from the rectifier into the commercial power source and then dress the power cord to the rack using plastic cable ties.

Adjusting equipment

Note: Do not adjust the over voltage shutdown (OV ADJ) potentiometer on the front panel of replacement rectifiers. This potentiometer is adjusted at the factory and does not require readjustment upon installation into an existing power system.

Note: The following steps adjust the float voltage of the replacement rectifier. This float voltage must be adjusted to match the float voltage settings of all other system rectifiers to ensure proper load sharing.

- 1 At the QBL15, connect a voltmeter to the positive (+) and negative (-) test points (located with the QPC188 Battery Monitor).
- 2 Set the AC BRKR switch on the replacement rectifier to ON.
- 3 Set the CB0 circuit breaker on just one Meridian 1 column to ON to establish a minimum load.
- 4 Adjust the VOLT ADJ potentiometer on the front panel of the replacement rectifier to obtain the desired float voltage reading, ± 100 mV dc.
- 5 Set the CB0 breaker on the Meridian 1 column to OFF and then set the AC BRKR switch on the rectifier to OFF.
- 6 Disconnect the multimeter and follow normal power up procedure to restore the system to service.

NT6D52 Rectifier and QBL15 Power/Battery Distribution Box connections



NT6D6008 Core and NT9D1103/NT5D2103 Core/Network Card Cage

To replace a defective backplane in an NT6D60 Core Module, an NT5D21 Core/Network Module, or in an NT9D11 Core/Network Module, you must replace the card cage.

Note: You will receive a NT5D2103 card cage as a replacement for a NT9D1103 card cage; the latter unit is no longer available.

WARNING

The following procedures describe card cage replacement for redundant systems such as 61C, 81, and 81C. A single-CPU system, such as 51C, must be shut down to replace the card cage.

Use this procedure to replace the card cage in a redundant system by maintaining system operation with the active CPU and replacing the card cage of the standby CPU. See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 To access the Cores during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the rear of each Core or Core/Network Module. You must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XON

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The Call Processor (CP) Card must be inactive in the card cage you are replacing.

- Check the status of the CP cards:

LD 135

STAT CPU determine which CP card is active

If necessary, switch Cores:

SCPU switch Cores

**** exit LD 135

- Set the NORM/MAINT switch to MAINT on the now *active* CP card.
 - Connect the terminal to the port on the inactive Core.
- 3 Set the NORM/MAINT switch to MAINT on the CP card in the card cage you are replacing (the inactive Core). Wait 2 minutes for the system to initialize. (A series of INI messages will be seen on the terminal for the inactive Core.)
 - 4 The NT6D64 Core Multi Disk Unit (CMDU) or NT5D20 IOP/CMDU in the card cage you are replacing must be inactive:

- Check the status of the CMDUs or IOP/CMDU:

LD 137

STAT CMDU determine which CMDU or IOP/CMDU is
active

If necessary, switch CMDUs or IOP/CMDUs:

SWAP switch CMDUs or IOP/CMDUs

**** exit LD 137

- Set the ENB/DIS switch to DIS on the CMDU or IOP/CMDU in the card cage you are replacing.

- 5 Disable the clock controller card and any QPC720 Primary Rate Interface or QPC472 Digital Trunk Interface (PRI/DTI) Cards in the card cage you are replacing.

- Check the status of the clock controller cards:

LD 60

SSCK x "x" is the Core (0 or 1)

If the clock controller card is active, switch to make it inactive:

SWCK

Disable the clock controller card:

DIS CC x "x" is the Core (0 or 1)

- Set the ENB/DIS switch to DIS on the clock controller card in the card cage you are replacing.
- Disable any PRI/DTI cards in the card cage you are replacing.

DISL loop disable the network loop and the card

**** exit LD 60

Note: If the PRI/DTI cards service loops that cannot be out of service, move the cards to a different module and reenable them.

- 6 Set the ENB/DIS switch to DIS on all CNI cards and the IOP/CMDU or IOP/CMDU in the card cage you are replacing.

- 7 Follow the steps below to disconnect and remove the NT8D22 System Monitor (do *not* turn off the blower unit in the front of the pedestals):
- Load LD 37 and software disable the associated SDI port:
LD 37
DIS TTY x disable the device associated with the port
******** exit LD 37
 - If the card cage you are removing is in the column with the master system monitor (should be column 0):
On the master system monitor (column 0), disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.
 - If the card cage you are removing is in the column with a slave system monitor (should be column 1):
On the master system monitor (column 0), disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.
On column 1, disconnect the cables, then pull the system monitor out of the slot.

CAUTION

If the system monitors are not removed, the system may shut down.

- 8 Follow the appropriate step below to turn off power to the module:
 - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column INCLUDING THE NETWORK GROUP IN THAT COLUMN. Relocate essential services from this group before proceeding.

- With DC power, set the switch on the NT6D41 CE Power Supply to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)
- 9 Follow the steps below to remove all cards from the module:
 - Tag and disconnect all cables to the front of the module. Tape over the contacts to avoid grounding. Tape or tie all cables to the sides so the working area in front of the card cage is totally clear.
 - Set the ENB/DIS switch to DIS on any cards that are not already set to disable.
 - Tag the cards so they can be returned to the same slot in the replacement card cage. Remove the cards, including the bus terminating units (BTUs) between slots 4 and 5, and slots 5 and 6 in option 81 and between slots 0 and 1 and 1 and 2 in option 61C when equipped with the NT9D11 Core/Network Modules.

- 10** Follow the steps below to disconnect cables to the I/O panels and backplane at the rear of the module:
 - Tag and disconnect cables from the I/O panels.
 - Remove the I/O panels and the I/O safety panel over the backplane to access the rear backplane connectors.
 - Use the P0741489 Extraction Tool to disconnect cables to the backplane connectors. (See “Options 51C, 61C, 81, and 81C cable guidelines” on page 13.)
- 11** Follow the steps below to disengage the module:
 - Remove the two mounting screws that secure the rear of the card cage to the module.
 - Remove the front trim panels on each side of the card cage.
 - Remove the three mounting screws that secure the front of the card cage to the bottom of the module.
 - Pull the card cage halfway out of the module.
- 12** Follow the steps below to disconnect power and ground connections at the rear of the module:
 - Disconnect the system monitor ribbon cables to J1 and J2.
 - Disconnect the module power connectors. These are small orange connectors plugged into the module power distribution unit (MPDU) with AC power, or connected to each other with DC power.
 - Disconnect the logic ground (orange) wire from the backplane bolt.
 - Disconnect the frame ground (green) wire from the frame ground post.

WARNING

Do *not* disconnect the main power connectors (large orange connectors) at the top and bottom of the module.

- 13 Pull the card cage all the way out of the module.

Note: For AC-powered systems, after the card cage is out of the module you must remove the MPDU and reinstall it on the replacement card cage. The screw-heads for the MPDU are in the wall of the power supply slot.

- 14 Remove the floating power connector (the black connector) on the rear of the card cage. Using the same mounting screws and nuts, attach the connector to the new card cage.

Note: Check the orientation of the connector. Looking at it from the rear of the card cage, the upper left corner pin should be empty (no wire) and the lower right corner pin should have a wire installed. The green wire should be up.

Installing equipment

- 1 Set the backplane jumpers in the card cage for Core 0 and Core 1 in option 81, Core/Network 0 and Core/Network 1 in options 61C and 81C, and Core/Network Module in option 51C. The jumpers are located on the backplane, along the bottom of the front side (the side facing into the card cage assembly):
- For Core 0, verify that all four jumpers are closed (there is a plug over both pins). For Core/Network 0, verify that the jumper between card slots 14 and 15 is closed.
 - For Core 1, verify that jumper JB4, between slots 9 and 10, is open (jumper plug not installed). Verify that the other three backplane jumpers are closed. For Core/Network 1, verify that the jumper between card slots 14 and 15 is open.

CAUTION

If the Core or Core/Network Module jumpers are set incorrectly, the system will not load and operate correctly.

Note: If you are replacing your NT9D1103 card cage with a NT5D2103 card cage, skip the following step, Step 2. Network terminators in the NT9D1103 card cage have been replaced by hybrid bus terminators that are actually built into the NT5D2103 card cage.

- 2 Install the BTUs in the replacement NT6D6008 Core card cage. The components must be on the right (looking at the front of the card cage):
 - Install Q477A-9 between slots 4 and 5
 - Install Q477B-10 between slots 5 and 6
- 3 Reposition the EMI shield (it looks like a brass grill) in the base of the module. Tape over the front mounting tabs to hold the shield in position. The tape will be removed later.
- 4 Slide the new card cage about halfway into the module. Hold the card cage firmly while the ground and power connections are attached at the rear of the module:
 - Attach the system monitor ribbon cables (J1 goes down to the pedestal, J2 goes up the column).
 - Attach the frame ground (green) wire to the frame ground post on the module. (A 5/16" socket wrench is needed for this operation.) Remove the nut and the lockwasher at the top of the post. Put the frame ground connector over the post. Reinstall the top lockwasher and the nut, then tighten the nut down.
 - Attach the logic ground (orange) wire. Remove one nut and the lockwasher. Put the connector over the post, reinstall the lockwasher and nut, then tighten the nut down. (A 3/8" socket wrench is needed for this operation.)
 - Connect the module power connectors to the MPDU for AC power, or to each other for DC power.
- 5 Follow the steps below to install the new card cage in the module:
 - Slide the card cage the remainder of the way into the module.
 - Check the position of the EMI shield. If it has shifted, reposition it. Remove the tape holding the EMI shield.
 - Secure the card cage to the module with the three screws in the front and the two screws in the rear.

- 6 Replace the trim panels on both sides of the card cage.

Note: If you are replacing your NT9D1103 card cage with a NT5D2103 card cage, skip the following step (Step 7). In the NT5D2103 card cage, the Core Bus Terminator function has been taken over by the hybrid bus terminators actually built into the card cage.

- 7 Install the NT6D6003 CBT Card in slot 13 in the NT6D60 Core module.

Note: All jumpers on the CBT card are preset to open (the two pins are not connected together by a jumper plug) and must be left open. The card may, however, have jumper plugs installed over one pin on the jumpers. The plugs are provided as extra plugs that may be required on some other card or for future requirements.

- 8 Install the module power supply in the slot labeled "CE pwr sup" in the Core or Core/Network card cage. Perform a hardware sanity check:
 - Turn on power to the module:

With AC power, set the main circuit breaker to ON (up) in the rear of the pedestal.

With DC power, set the breaker to ON (up) in the pedestal, then set the switch to ON (up) on the power supply in the module.
 - Check the LED pattern for the card cage you are installing:
 - On the NT6D003 CBT Card, there are five LEDs are on the component side of the card (not on the faceplate). The top light is not used. The pattern of the remaining four LEDs must be OFF-OFF-OFF-OFF (from the top down) for Core 0, and ON-OFF-OFF-OFF for Core 1.
 - On the NT5D2103 card cage, the LEDs are on the front side of the backplane. The LEDs are in two vertical columns, one on either side of slot 12 (if necessary, remove the CNI card to view the LEDs). The LEDs on the right side of the slot apply to Core 0 and must be (from the top down) OFF-OFF-OFF-OFF. Those on the left side apply to Core 1 and must be ON-OFF-OFF-OFF.
 - Shut down power to the module again.

With AC power, set the main breaker for the column to OFF (down).

With DC power, set the switch on the power supply and the pedestal breaker for the module to OFF (down).
- 9 Install the module power supply in the slot labeled "CE pwr sup" in the Core or Core/Network card cage. Follow the steps below to reconnect cables to the backplane:
 - Reconnect all cables to the backplane connectors.

CAUTION

If you try to insert the cable connector at an angle, pins may be bent or broken.

- Route the NTND14 CNI to 3PE cables to the right side (facing the rear) of the module and tie-wrap them to the cable restraint bracket behind the I/O panel.
 - Position and secure the I/O panels.
 - Position and secure the I/O safety panel.
- 10** Reinstall the 3PE card. Set the ENB/DIS switch to ENB.
- 11** Set the ENB/DIS switch on the clock controller card to DIS. Seat the clock controller card; leave the ENB/DIS switch set to DIS and do not connect the faceplate cables.
- 12** Follow the appropriate step below to turn on power to the column or the module power supply:
- With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply in the module.
- 13** Follow the appropriate steps below to connect the clock controller cables:
- For a QPC471 Clock Controller card, connect the NT8D79 cables from the primary or secondary reference to the faceplate of the clock controller card. For options 81 and 81C, connect the NT8D74 cable from the NT8D36 InterGroup Module to the clock controller card.
 - For QPC775 Clock Controller Cards in options 81 and 81C, connect the NT8D74 cable from the junctor board to the faceplate of the clock controller card. Then connect the NT8D79 cables from the primary or secondary reference to the faceplate of the clock controller card.
 - Leave the ENB/DIS switch set to DIS on QPC471 or QPC775 cards.
- 14** Reinstall the NT5D20 IOP/CMDU, then set the ENB/DIS switch to ENB.
- As the card performs card-level power-up tests, watch the faceplate HEX display for flashing error codes. See *X11 input/output guide* for an explanation of the codes.

- 15 Set the NORM/MAINT switch on the CP card to MAINT. (This will keep the system in split mode when the card is reinstalled.)
- 16 Reinstall the CP card. As the card performs card-level power-up tests, watch the LCD display and output from the CPSI port for error messages:
 - Following the “Selftest Complete” message, watch the LCD on the CP card for the message “IOP in Slot 16.”
 - Watch the LCD for the message “Loading Disk OS.” As the system attempts to access the hard disk, watch the LCD for error messages.
 - Watch for system reload (SYS) and initialization (INI) messages on the terminal.

Note: If you replaced the CMDU during the card cage replacement procedure, you must match the hard drive to the current software. If you replaced a CP card or an IOP/CMDU, you must match the ROM on the card to the current software. To match the software, follow the appropriate steps in “Software installation tool” in *Software conversion procedures* (553-2001-320).

- 17 Seat all CNI cards, but leave the ENB/DIS switches set to DIS.
- 18 Load LD 135 and check the status of all configured CNI cards:

LD 135

STAT CNI	get the status of all configured CNIs
TEST CNI c s	test each configured CNI on the inactive side
****	exit LD 135

- 19 Set the ENB/DIS switch to ENB on the clock controller card.
- 20 Set the ENB/DIS switch to ENB on all CNI cards.
- 21 Press and release the MAN RST button on the CP card in the new card cage. When SYS700 messages appear on the LCD display, set the NORM/MAINT switch to NORM. Within 60 seconds, the LCD will display the following messages, confirming the process:

RUNNING ROM OS
ENTERING CPU VOTE

By the active CPU, an HWI533 message from the CPSI or SDI port indicates the memory is shadowed.

Note 1: At this point, the other Core is still active and in split mode. The Core in the new card cage is the standby (inactive) side. The memories are shadowed (synchronized), but the hard disks are not synchronized (redundancy is disabled).

Note 2: A CNI port LED may not go out if a network loop corresponding to that port is disabled.

- 22 Set the NORM/MAINT switch to NORM on the CP card in the active Core and perform a redundancy sanity test:

LD 135

STAT CNI	get the status of all configured CNIs
STAT CPU	get the status of both Cores
TEST CPU	test the inactive CP card and CP to CP cable
TEST CNI c s	test each configured CNI on the inactive side

Note: Testing the CP and CNI cards can take 2 minutes or more for each test.

- 23 Switch Cores and test the other side:

SCPU	switch to Core 0
TEST CPU	test the inactive CP card and CP to CP cable

- 24** Get the status of the CP cards and memories, and of the CNIs:

STAT CPU get the status of both Cores
STAT CNI get the status of all configured CNIs
******** exit LD 135

- 25** Load LD 137 and synchronize the hard disks. To be sure the contents of CMDU 1 are copied to CMDU 0, verify that CMDU 0 is disabled:

LD 137

STAT get the status of CMDUs, IOPs, and redundancy
SWAP switch CMDUs (if necessary)
SYNC synchronize the hard disks

Note: Synchronization may take up to 15 minutes.

- 26** Get the status of the CMDUs and be sure CMDU 0 is active. Switch CMDUs if necessary:

STAT get the status of CMDUs, IOPs, and redundancy
SWAP switch CMDUs (if necessary)
******** exit LD 137

- 27** Test the IOP to IOP SCSI connection and test the CMDUs:

LD 137

TEST SCSI check the IOP to IOP connection and access to the
 CMDUs
TEST CMDU test the hard and floppy disk drives
 (a floppy disk must be installed)
******** exit LD 137

28 Test Core functions:

LD 135

TEST CPU	test the inactive CP card and CP to CP cable
TEST IPB	test the backplane protocol on the inactive side
TEST CNI c s	test each configured CNI on the inactive side

If all the tests pass, switch Cores and test the side that is now inactive:

SCPU	switch to the other Core
TEST CPU	test the inactive CP card and CP to CP cable
TEST IPB	test the backplane protocol on the inactive side
TEST CNI c s	test each configured CNI on the inactive side

29 Clear displays, major alarms, and minor alarms:

CDSP	clear the display
CMAJ	clear all major alarms
CMIN ALL	clear all minor alarms
SCPU	switch to the other Core
CDSP	clear the display
****	exit LD 135

30 Software enable, from the active side, the clock controller and PRI/DTI cards:

- Enable the clock controller card:

LD 60

ENL CC x

TRCK aaa if necessary, set tracking

- Enable the PRI/DTI cards:

ENLL loop

******** exit LD 60

- 31** Follow the appropriate steps below to reinstall and check the system monitor:

- If you replaced the card cage in the column with the master system monitor:

Reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the system monitor.

- If you replaced the card cage in the column with the slave system monitor:

Reinstall the system monitor in column 1 first.

On the master system monitor, reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the system monitor.

- Enter:

LD 37

STAT XSM

check the status of the system monitors

exit LD 37

- 32** Tag defective equipment with a description of the problem and package it for return to a repair center.

NT6D6003 Core Bus Terminator Card

Use this procedure to replace a Core Bus Terminator (CBT) card.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Note: The CBT is not required with NT5D21 Core/Network Modules.

- 1 The CBT card must be on the inactive Core. If you need to switch the active Core:
LD 135
SCPU
- 2 Unhook the locking devices on the CBT card; pull it out of the card cage.
- 3 Check the replacement CBT card. All jumpers on the card should be preset to open (the two pins are not connected together by a jumper plug) and must be left open.

Note: The card may, however, have jumper plugs installed over one pin on the jumpers. The plugs are provided as extra plugs that may be required on some other card or for future requirements.

- 4 Insert the replacement CBT card into the vacated slot.
- 5 Test the functions of the CBT card in LD 135:
TEST CPU test the CP card and CP to CP cable
TEST IPB test the backplane protocol
TEST CNI c s “c” is the CPU (0 or 1), “s” is the slot (8–12);
perform this test for each CNI in the module

If all the tests pass, switch the active Core:

SCPU

- If there is a problem with any of the tests, CCED system messages are generated.
- If there is no problem, exit LD 135 by entering ****

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT6D63 I/O Processor Card

Use this procedure to replace an I/O Processor (IOP) card in a:

- redundant system without disrupting call processing
- single CPU system, which requires disruption of call processing

Note: If you are replacing a faulty IOP and an associated CMDU with an NT5D20 IOP/CMDU, refer to “Replacing the NT6D63 IOP and the NT6D64 CMDU with the NT5D20 IOP/CMDU” on page 61

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Note: In redundant system option 61C with the NT9D11 Core/Network Modules and option 81, the normal procedure is to replace the faulty I/O Processor card on the inactive Core to allow uninterrupted call processing by the active Core. The Core that is processing calls is defined as *active* and the Core not processing calls is defined as *inactive*.

Check the status of the system CPUs, the disk drives synchronization, and perform data dump as preliminary steps in the replacement procedure:

- 1 Identify the faulty IOP card in the system and check if the faulty card is in the active or inactive Core by checking the status of both CPU:

LD 135	to load the program
STAT CPU	to check CPUs status

If CPU 0 is active and the faulty IOP is associated with inactive CPU 1, proceed with step 2. If CPU 0 is active and the faulty IOP is associated with CPU 0, perform switchover to make CPU1 the active CPU. Perform switchover and check the CPU status:

SCPU	to perform switchover to CPU 1
STAT CPU	to check CPUs status
****	to exit the program

Verify that the switchover to CPU1 was successful and that CPU 0 is now inactive.

- 2 Verify that disk drives in two Cores are synchronized:

LD 137	to load the program
STAT	to get the status of the two disk drives

If disk drives are synchronized, proceed with step 3. If they are not synchronized, execute the SYNC command:

SYNC	to synchronize the drives
****	to exit the program

- 3 Perform equipment data dumb from the active Core (with a known good IOP card):

LD 43	load LD 43
EDD	execute datadump and wait until "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" are displayed before exiting the program.
****	exit LD 43

- 4 Set the NORM/MAINT switch on the Call Processor (CP) card to MAINT on the *active* Core.
- 5 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 6 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
 - Press and hold down the MAN RST button on the CP card on the *inactive* Core.
 - While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to MAINT.
 - Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

- 7 To remove the faulty IOP card and replace the data cartridge from the faulty IOP to the replacement IOP:
 - Set the ENB/DIS switch on the faulty IOP to DIS.
 - Remove the IOP from its card slot in the *inactive* Core.
 - Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the IOP card.
 - Plug the above QMM42 Data Cartridge into the replacement IOP card and install the screw that secures it to the IOP card.
- 8 To install the replacement IOP card into the IOP card slot:
 - Set the ENB/DIS switch on the replacement IOP to DIS.
 - Install the IOP card into its vacant card slot and lock the locking devices by pushing them gently towards the faceplate.
 - Set the ENB/DIS switch to ENB and observe the card LED during self-test. The LED should flash three times and stay lit until the card is enabled.
- 9 Press the MAN RST button on the CP card on the *inactive* Core and wait until system sysloads and initializes.

10 Enable the IOP and check its status:

LD 137	to load the program
ENL IOP	to enable the IOP
STAT IOP	to check the IOP status

11 To update the ROM on the replacement IOP card to the software currently residing on the CMDU hard disk:

Note: Refer to “Software installation tool reference” in *Software conversion procedures* (553-2001-320).

- Activate the software installation tool by inserting disk A1 from the software package into the CMDU in the Core containing the replacement IOP card.
- Press the MAN RST button on the CP card in the Core containing the replacement IOP card.
- Select the following options in sequence:
 - <f> to install IOP ROM only
 - <y> to start installation
- Specify software installation from the hard disk and follow screen directions until the install menu returns.
- Remove the disk from the CMDU.
- Select the following options to quit and reboot the system:
 - <q> to quit
 - <y> to confirm quit
 - <a> to reboot the system

12 Test the replacement IOP card and the CMDU:

LD 137	to load the program
DIS IOP	to disable the IOP card
TEST IOP	to test the IOP operation
ENL IOP	to enable the IOP
TEST CMDU n	to test the CMDU(s) operation where n is the inactive Core CMDU

If there is a problem, a CIOD system message is generated.

13 To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following three steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced IOP):

- Press and hold down the MAN RST button on the CP card of the *inactive* Core.
- While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.
- Release the MAN RST button.

After several minutes, an "HWI533" message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

14 Set the ENB/DIS switch on all CNI cards in the *inactive* Core to ENB.

15 Synchronize the disk drives of the two Cores:

LD 137	to load the program
STAT	to get status of both IOPs and CMDUs
SYNC	to synchronize the drives
****	to exit the program

16 Verify CPU redundancy and CNI operation:

LD 135	to load the program
STAT CPU	to get status of both CPUs
STAT CNI	to verify the operation of all CNI cards

17 Place the *active* CPU in the normal mode by setting the NORM/MAINT switch on the CP card to NORM.

- 18** Check the CPUs and switch the call processing to the currently *inactive* CPU:

LD 135	to load the program
STAT CPU	to get status of both CPUs
SCPU	to switch to currently inactive CPU and make it active
STAT CPU	to check the status of both CPUs again to verify that the switchover occurred
****	to exit the program

- 19** Check the status of the replacement IOP and the associated CMDU in the *active* Core and make sure they are operating correctly:

LD 137	to load the program
STAT	to get status of both IOPs and CMDUs
DIS IOP	to disable the IOP in the active Core
TEST IOP	to verify the operation of IOP card in the active Core (replacement IOP)
ENL IOP	to enable the IOP after the test
TEST CMDU n	to test the operation of the CMDU
****	to exit the program

- 20** Tag defective equipment with a description of the problem and package it for return to a repair center.

NT6D64 Core Multi Drive Unit

Use this procedure to replace the Core Multi Drive Unit (CMDU). See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Note: If you are replacing a faulty CMDU and an associated IOP with an NT5D20 IOP/CMDU, refer to “Replacing the NT6D63 IOP and the NT6D64 CMDU with the NT5D20 IOP/CMDU” on page 61

Removing equipment

- 1 Software disable the CMDU you are replacing:
LD 137
STAT CMDU x x is the CMDU number (0 or 1)
If the CMDU is not disabled enter:
DIS CMDU x
**** exit LD 137
- 2 If needed, save (datadump) the current data configuration to the known good CMDU:
LD 43
EDD execute datadump
**** exit LD 43
- 3 If there is a floppy disk in the CMDU you are replacing, remove the floppy disk.
- 4 Set the power switch on the front of the CMDU to OFF (down).

- 5 Wait at least 10 seconds, then unhook the locking devices on the CMDU and gently pull the unit out of the card cage.

CAUTION

You must wait *at least 10 seconds* before you remove the CMDU from the card cage. This allows the hard disk to stop.

Installing equipment

- 1 Insert the replacement CMDU into the vacated slot and hook the locking devices.
- 2 Set the power switch on the front of the CMDU to ON (up).
- 3 If there was a floppy disk in the CMDU you replaced, install the floppy disk in the replacement CMDU.
- 4 Software enable and test the CMDU:

LD 137**ENL CMDU x**

The system will respond with:

DISK RDUN WILL BE ENABLED, ENTER Y(ES) TO CONFIRM.

Enter:

YES

If this operation fails, enter:

SYNC	synchronizes the hard disks
TEST SCSI	check access to the CMDU
TEST CMDU x	check the hard and floppy disk drives
****	exit LD 137

If there is a problem, a CIOD system message is generated.

- 5 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT6D65 Core to Network Interface Card

Use this procedure to replace the Core to Network Interface (CNI) card. See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Replacing the CNI card in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time (after midnight).

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Before replacing a Core to Network Interface (CNI) card, you can test it in an unused CNI slot (in case, for example, there is a bent pin on the backplane). If the card works correctly in the new slot, you can leave it there. To switch slots:

— The Core associated with the CNI card must be inactive:

- If you need to switch Cores:

LD 135
SCPU

- Set the NORM/MAINT switch to MAINT on the *active* CP card.

— Software disable the CNI card:

DIS CNI c s “c” is the CPU (0 or 1), “s” is the card slot (8–12)
******** exit LD 135

- Software configure the new slot:

LD 17**EXT x 3PE**

“x” is the number (0–4) of the associated 3PE card(s)

CNI X s p

delete the group(s) associated slot

CNI s p g

add group(s) to new slot

exit LD 17

LD 43**EDD**

datadump the new configuration

exit LD 43

- Insert the CNI card in the new slot. Move the cables to the shrouds on the backplane to the connectors for the new slot.
- Enable the CNI card and switch the CP cards:
 - Set the NORM/MAINT switch to NORM on the *active* CP card.
 - **LD 135**
ENL CNI c s
SCPU

Use the following procedure to replace a CNI card.

Removing equipment

- 1 The Core associated with the CNI card must be inactive:
 - If you need to switch Cores:
LD 135
SCPU
 - Set the NORM/MAINT switch to MAINT on the *active* CP card.
- 2 Set the ENB/DIS switch to DIS on the CNI card you are replacing.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Set the ENB/DIS switch to ENB on the replacement card.
- 4 Set the NORM/MAINT switch to NORM on the *active* CP card.
- 5 Software enable and test the CNI card and configured ports on the card:

ENL CNI c s "c" is the CPU (0 or 1), "s" is the card slot (8–12)

TEST CNI c s

SCPU

exit LD 135

Note: Due to the need to reestablish memory shadowing and contents, the test command may take a minute or more depending on memory size. The LED on the CNI card flashes as the test runs.

If there is a problem, a CCED system message is generated (LEDs on the CNI cards stay lit on the inactive Core).

Note: If the network loop corresponding to a CNI port is not enabled, the LED for that port may not go out.

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT6D66 Call Processor Card

Use this procedure to replace an NT6D66 Call Processor (CP) card.

WARNING

Replacing the CP in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time (after midnight).

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

Note: The following procedure can be performed on a system equipped with NT5D61 IODU/C, NT5D20 IOP/CMDU, or NT6D63 IOP and NT6D64 CMDU cards.

Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module in option 81 or Core/Network Module in options 51C, 61C, and 81C for the card you are replacing. You must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

There should be an SDI TTY connection at J30, which should remain connected at all times to monitor system status.

- 2 The CP card you are replacing must be on the inactive Core. Check the status of the CP cards:

LD 135

STAT CPU determine which CP card is active

If necessary, switch Cores:

SCPU switch Cores

**** exit LD 135

- 3 Put both Cores into maintenance mode and remove the CP card you are replacing using the following sequence:
 - First, set the NORM/MAINT switch to MAINT on the *active* CP card (the one you are *not* replacing).

WARNING

Setting the NORM/MAINT switch to MAINT on the inactive CP card at this point will cause an init.

- Then, set the NORM/MAINT switch to MAINT and press the MAN RST button on the CP card you are replacing. Unhook the locking devices in the CP card you are replacing and pull it out of the card cage.

Installing equipment

- 1** Set the NORM/MAINT switch to MAINT on the replacement card.
- 2** Match the ROM on the replacement card to the software currently on the CMDU hard disk by using the following procedure:
 - For systems equipped with an IODU/C, insert the Install diskette which corresponds to the NT6D66 Call Processor
 - For systems equipped with a CMDU or IOP/CMDU, insert disk A1.
 - Insert the CP replacement card into its vacated slot and hook the locking devices.
 - Press the MAN RST button on the replacement CP card.

- 3 Perform the following 2 steps for systems equipped with an NT5D61 IODU/C:

- At the Main Menu select <u> to go to the Install Menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <u> - To Install menu.

<t> - To Tools menu.

<q> - Quit.

Enter choice > u

553-7780

- Insert the Keycode diskette when prompted and select <a> to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> <a> - Continue with the keycode validation

(the keycode diskette is in the floppy drive).

<q> - Quit.

Enter Choice > a

553-7729

- Select the following options in sequence from the Install Menu:
 - <e> to install CP ROM only
 - <y> to start installation
 Specify software installation from the hard disk.
- Follow all screen directions until the Install Menu returns.
- Select the following options to quit:
 - <q> to quit
 - <y> to confirm quit
- Remove disk A1 from the CMDU or IOP/CMDU and then reload the system:
 - <a> to reboot the system.
- Press the MAN RST button and then set the NORM/MAINT switch to NORM on the replacement CP card. (It may take 2 to 4 minutes for memory synchronization to take place.)
- Refer to "Software Installation Tool Reference" in *Software conversion procedures* (553-2001-320).
- Check the status of the replacement CP card from the active side:

LD 135

STAT CPU

If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

If there are no CCED messages generated by the STAT CPU command, continue with step 4.

- 4 After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

TEST CPU the test causes a cold start on the inactive CPU

If the test results in:

CCED014 "Test failed because unable to enter SPLIT mode"

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

TEST CPU to test the CP card

- 5 After a successful test that takes 2 or 4 minutes, proceed with the following:

- Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- Check the status of the CPUs:

STAT CPU

- Check the status of the CNIs:

STAT CNI

- Switch Cores and exit the program:

SCPU

**** exit LD 135

If there is a problem, CCED system messages are generated.

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

Note: Repeat the process for the replacement of the second CP card (if applicable) by moving the terminal cable to the J25 port on the I/O panel of the other Core or Core/Network Module and continuing the procedure starting at step 2 of the "Removing equipment" section.

- 7 Synchronize the hard disks on both CMDUs or IOP/CMDUs:

LD 137

SYNC synchronizes the CPUs

Synchronization may take as long as 40 minutes. Progress reports appear on the TTY periodically.

NT7D10 Power Distribution Unit DC

Use this procedure to replace the power distribution unit (PDU) for DC-powered systems.

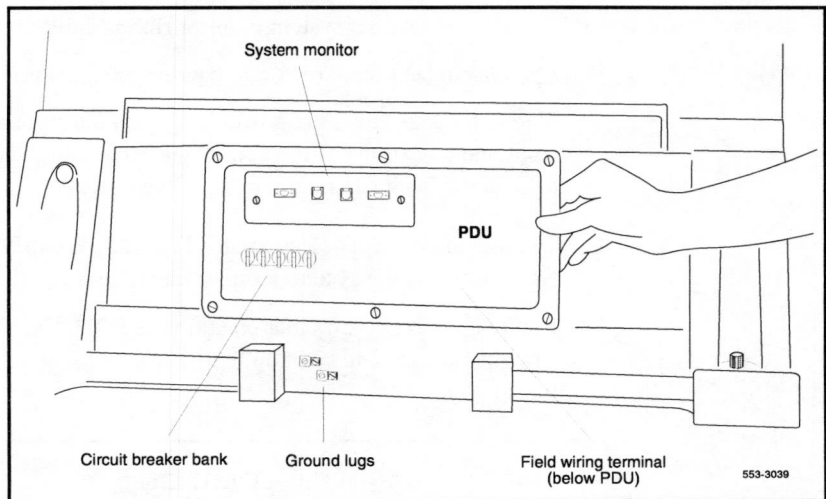
WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disconnect the DC power at the source (not at the PDU).
- 2 Remove the grill on the rear of the pedestal.
- 3 Set all five circuit breakers on the PDU to OFF (down). Figure 12 shows the location of the PDU in the rear of the pedestal.

Figure 12
NT7D10 Power Distribution Unit DC



- 4 Unseat the blower unit in the front of the pedestal:
 - Remove the grill on the front of the pedestal. Set the toggle switch on the front of the unit to OFF (left).
 - Turn the screws on the front of the unit counterclockwise and pull the unit forward several inches so the connector on the rear disengages.

WARNING

Do not pull the blower unit out of the pedestal. The unit is heavy and the blades on the blower may still be rotating up to 2 minutes after the power is turned off.

- 5 Disconnect cables that run between the module above the pedestal (module 0) and the top of the PDU:
 - Remove the rear cover on the module.
 - Remove the I/O safety panel over the backplane in the module.
 - Disconnect the system monitor ribbon cable from the PDU.
 - Disconnect the large orange power connector (J1) from the PDU.

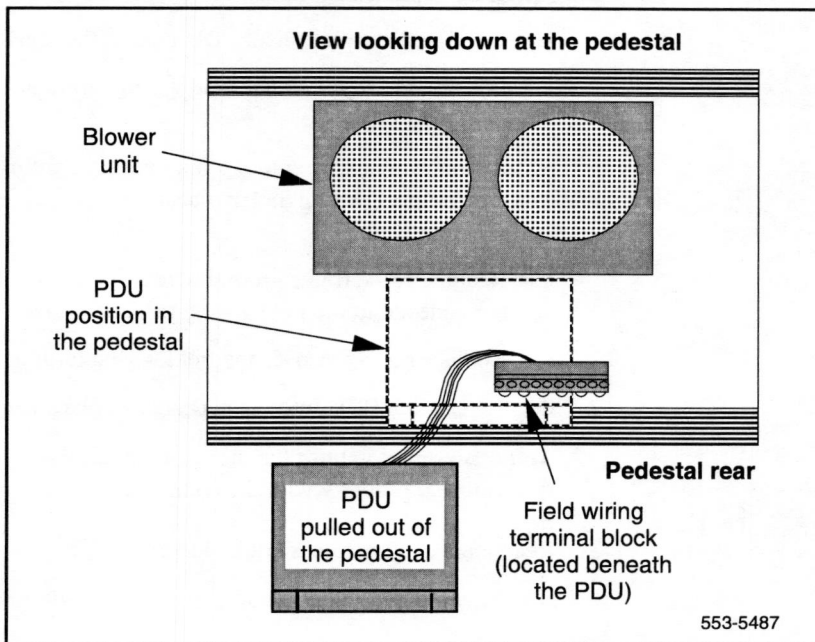
Note: To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

- 6 Tag and disconnect cables to the NT8D22 System Monitor. Loosen the two screws on the system monitor card and remove it from the PDU.
- 7 Remove the six screws that position the PDU. Carefully pull the unit straight forward and set it on the floor next to the pedestal (see Figure 13).

CAUTION

The PDU cannot be completely removed from the pedestal until cables to the field wiring terminal block are disconnected. Label wires carefully. Improper wiring can cause system damage.

Figure 13
Cabling between the PDU and the field wiring terminal block



8 Remove the field wiring terminal block:

- Remove the cover over the field wiring terminal block.
- Locate the frame ground wire that runs from the field wiring terminal block to the frame ground bolt inside the pedestal. Disconnect this wire at the terminal block.
- Carefully tag and then disconnect all input wiring to the field wiring terminal block. Take special note of any jumper wires that might be installed. It is not necessary to disconnect wiring that runs from the terminal block to the PDU.
- Remove the four screws that secure the terminal block in place and lift it out of the pedestal.

Installing equipment

- 1 Install the replacement field wiring terminal block:
 - Position the replacement PDU next to the rear of the pedestal.
 - Position the replacement field wiring terminal block and replace its mounting screws.
 - Reconnect all wiring to the field wiring terminal block, including any jumpers that might have been present on the terminal block that was removed.
 - Reconnect the frame ground wire from the frame ground bolt inside the pedestal to the field wiring terminal block.
 - Replace the cover over the field wiring terminal block.
- 2 Gently push the PDU into the pedestal. Replace the screws on the PDU.

Note: Be sure you push the unit straight back so the connector on the rear will seat properly with the connector for the blower unit.
- 3 Reconnect cables from module 0 to the PDU:
 - Attach power plug J1 and the system monitor cable.
 - Replace the I/O safety panel on the module.
 - Replace the rear cover on the module.
- 4 Reseat the blower unit:
 - Lift the unit slightly and slide it into the pedestal glides. Set the toggle switch to ON (right).
 - Tighten the screws on the front of the unit.

- 5 Insert the system monitor card into the PDU. Tighten the screws on the card. Reconnect cables to the system monitor faceplate.
- 6 Set all five circuit breakers on the PDU to OFF (down). Reconnect the source of DC power.
- 7 One at a time starting with the breaker for the blower unit, set the circuit breakers on the PDU to ON (up). Make sure the green LED lights on the power supply unit(s) in each module.

Note: On initial power up, the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.

- 8 Replace the pedestal grills in the front and rear.
- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT7D14, NT8D06, NT8D21, NT8D29 Power Supply AC

Use this procedure to replace AC power supplies:

- NT7D14 CE/PE Power Supply AC
- NT8D06 PE Power Supply AC
- NT8D21 Ringing Generator AC
- NT8D29 CE Power Supply AC

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Turn off power to the module power supply:
 - If there is a Module Power Distribution Unit (MPDU), set the circuit breaker(s) on the associated MPDU to OFF (down).

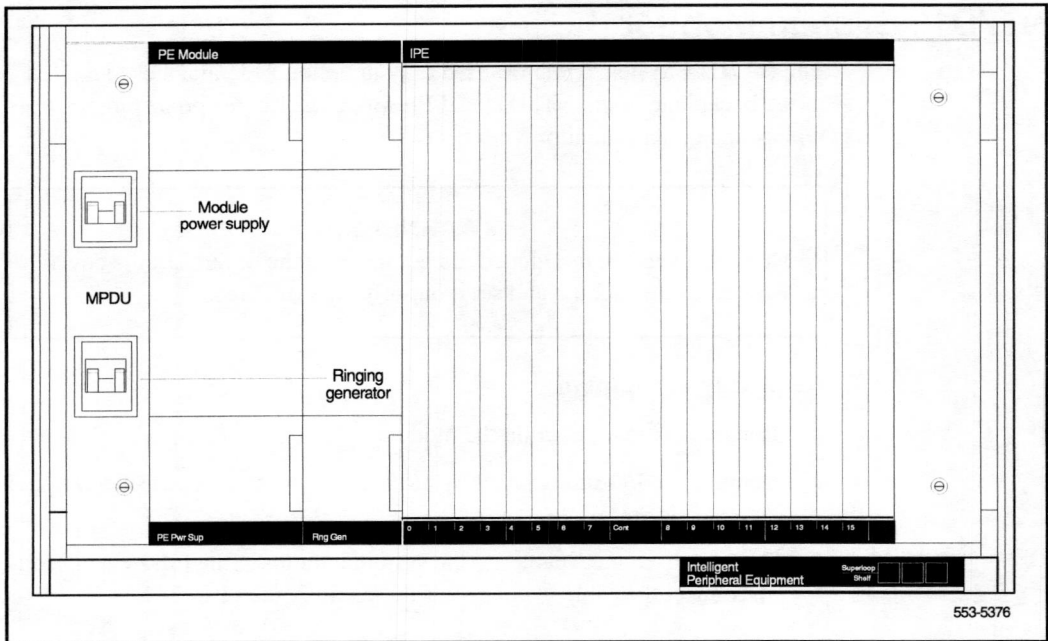
Note: If there are two circuit breakers on the MPDU, the top one is associated with the module power supply, the bottom one with the ringing generator (see Figure 14).

 - If there is no MPDU, set the switch on the power supply faceplate to OFF (down).
- 2 Unhook the locking devices on the power supply. Wait at least 5 minutes, then pull the power supply out of the card cage.

CAUTION

Power must discharge. Wait *five full minutes* before you remove the power supply from the module.

Figure 14
Dual circuit breaker and associated module power supplies



Installing equipment

- 1 Insert the replacement power supply into the vacated slot and hook the locking devices.

Note 1: If there is a switch on the power supply, set the switch to OFF (down) before you insert the power supply.

Note 2: On a replacement NT8D21, set option strapping the same as on the one you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

- 2 Turn on power to the module power supply. The green LED on the power supply should light and stay lit:
 - If there is an MPDU, set the circuit breaker(s) to ON (up).
 - If there is no MPDU, set the power supply switch to ON (up).

- 3 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT7D15 System Monitor

The NT7D15 System Monitor, used only in option 21A, attaches to the rear of the backplane in the NT8D11 CE/PE Module. Use this procedure to replace the system monitor.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Remove the rear cover on the module.
- 2 Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
- 3 Tag and disconnect cables to the system monitor in the following order: disconnect the cable to connector P3, then P2, then P1.

CAUTION

If you do not disconnect cables in the order given, the system will shut down.

- 4 Pull the card out of the connector on the backplane.

Installing equipment

- 1 Plug the replacement card into the vacated connector (the connector closest to the right) on the backplane before the cables are connected.

CAUTION

Cables must be *disconnected* when the card is installed. When you connect the cables, you must follow the order given or the system will shut down.

- 2 Connect cables to the system monitor in the following order: connect the cable to connector P1, then P2, then P3.
- 3 Replace the I/O safety panel.
- 4 Replace the rear cover on the module.
- 5 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT7D67CB Power Distribution Unit DC

Use this procedure to replace the power distribution unit (PDU) for DC-powered systems.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

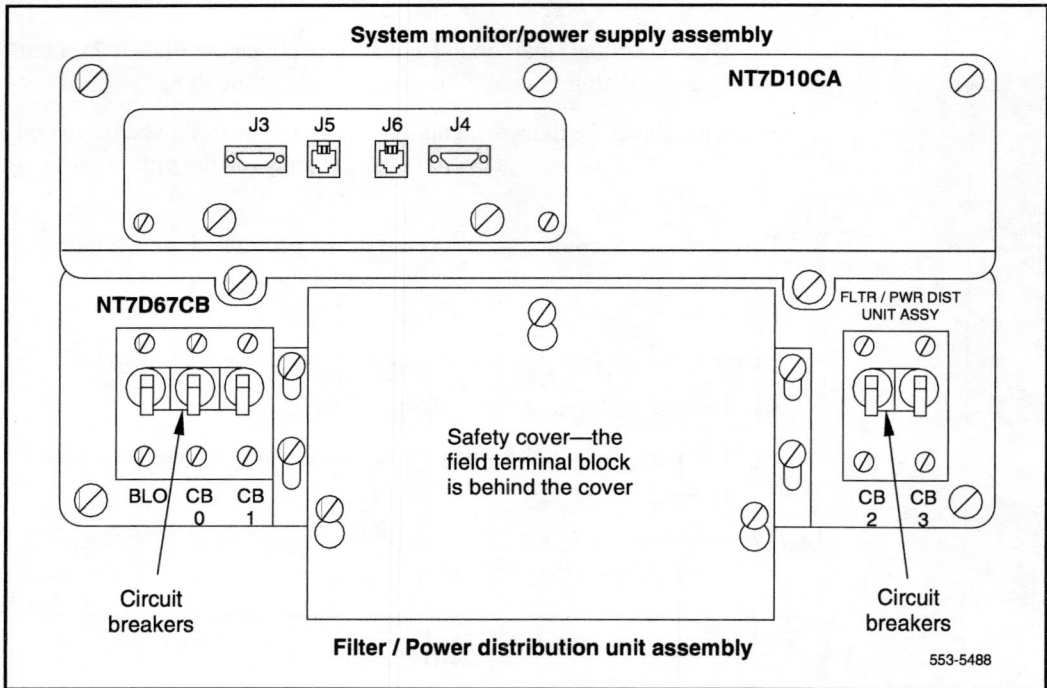
Removing equipment

- 1 Disconnect the DC power at the source (not at the PDU).
- 2 Remove the grill on the rear of the pedestal.
- 3 In the rear of the pedestal, set all five circuit breakers on the PDU to OFF (down). Figure 15 shows the PDU (labeled FLTR/PWR DIST UNIT ASSY on the equipment) and the NT7D10CA System Monitor/Power Supply Assembly (labeled XSM/PWR SUPPLY ASSY on the equipment).
- 4 Unseat the blower unit in the front of the pedestal:
 - Remove the grill on the front of the pedestal. Set the toggle switch on the front of the unit to OFF (left).
 - Turn the screws on the front of the unit counterclockwise and pull it forward several inches (you will see the L-bracket on the rear of the unit) until the connector disengages from the rear of the PDU.

WARNING

Do not pull the blower unit out of the pedestal. The unit is heavy and the blades on the blower may still be rotating up to 2 minutes after the power is turned off.

Figure 15
NT7D67CB Power Distribution Unit DC



- 5 Disconnect cables that run between the module above the pedestal (module 0) and the PDU:
 - Remove the rear cover on the module.
 - Remove the I/O safety panel over the backplane in the module.
 - Disconnect the system monitor ribbon cable from module 0.
 - Disconnect the large orange power connector (J1) from the PDU.

Note: To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

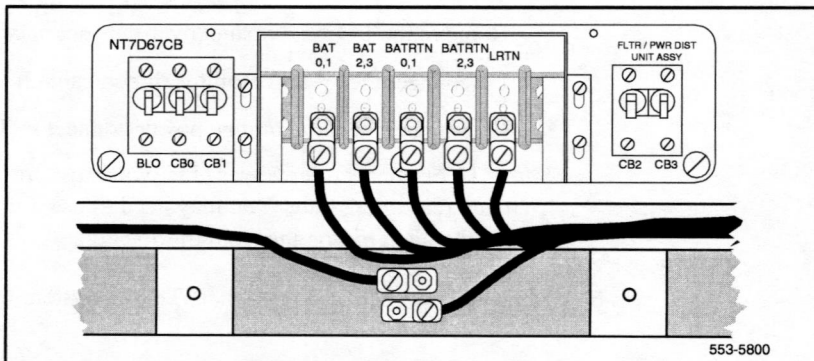
- 6 Tag and disconnect cables to the NT8D22 System Monitor faceplate.

- 7 Loosen the five screws that secure the NT7D10CA system monitor assembly. Pull the assembly out of the pedestal far enough to disconnect the cables to the PDU:
 - Disconnect the small orange connectors (J2 on the PDU, P2 on the system monitor assembly) on the left side of the PDU.
 - Disconnect the flat white connector to the small circuit board (P1 on the PDU, J1 on the system monitor assembly) on the right side of the PDU.
- 8 Pull the system monitor assembly out of the pedestal along with the attached ribbon cable and set it aside until the replacement PDU is installed.
- 9 Remove the plastic safety cover over the terminal block on the PDU:
 - Loosen the three screws holding the cover.
 - Lift the cover up, then over the three mounting screws on the front panel of the cover.
- 10 Tag and disconnect all wiring to the field wiring terminal block on the PDU (see Figure 16).

CAUTION

Label wires carefully. Improper wiring can cause system damage.

Figure 16
Field wiring terminals in the NT7D67CB PDU



11 Remove the PDU:

Note: When a system is shipped, a set of screws secures the leveling bracket at the rear of the PDU to protect against vibration during transit. If the shipping screws were not removed during initial installation, you must remove them now to pull the PDU out of the pedestal. Pull the blower unit all the way out of the pedestal so you can access the shipping screws on the leveling bracket.

- Loosen the three screws that secure the PDU.
- Remove the two vertical screws located in the rear of the PDU that hold the L-bracket to the lower pedestal.
- Pull the PDU out of the pedestal, being careful to not chafe the cables against the pedestal.
- Disconnect the frame ground wire from the PDU at the frame ground bolt inside the pedestal.

Installing equipment**1 Install the replacement PDU:**

- Connect the frame ground wire from the PDU to the frame ground bolt inside the pedestal.
- Guide the connector for the power cable through the hole in the top of the pedestal (do not allow the PDU to drop).
- Gently push the PDU into the pedestal. Position the leveling bracket (attached to the rear of the PDU) in the small opening toward the front of the pedestal. The leveling bracket will support the back of the PDU.

2 Install the NT7D10CA system monitor assembly:

- Connect the small orange connectors (J2 on the PDU, P2 on the system monitor assembly) on the left side of the PDU.
- Connect the flat white connector to the small circuit board (P1 on the PDU, J1 on the system monitor assembly) on the right side of the PDU.

- Guide the connector on the free end of the system monitor ribbon cable (from J2) up through the hole in the top of the pedestal and connect it to module 0.
 - Install and tighten the two vertical screws that attach the L-bracket to the PDU.
 - Gently push the system monitor assembly into the pedestal.
- 3 Tighten the screws that secure the PDU and the system monitor assembly.
- 4 Reconnect the remaining cables from module 0:
- Reconnect the large orange power connector (J1).
 - Replace the I/O safety panel.
 - Replace the rear cover to the module.

- 5 Reconnect all external wiring to the field wiring terminal block on the PDU:

Note: All wiring to the PDU must be routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal.

- Remove the plastic safety cover over the terminal block.
- Connect the red BAT (–48 V) wires to the terminal block:
 - for modules 0 and 1 connect to the BAT 0,1 terminal
 - for modules 2 and 3 connect to the BAT 2,3 terminal

The safety ground/protective earth wires and all wiring to the block in the PDU must be neatly routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal. This ensures that there is room to install the PDU cover, safety cover, and rear grill.

- Connect the black BATRTN (48 V return) wires to the terminal block:
 - for modules 0 and 1 connect to the BATRTN 0,1 terminal
 - for modules 2 and 3 connect to the BATRTN 2,3 terminal
- Connect the orange (or white) wire to the LRTN terminal.

- 6 Reinstall the plastic safety cover over the terminal block.
- 7 Reseat the blower unit:
 - Lift the unit slightly and slide it into the pedestal glides. Set the toggle switch to ON (right).
 - Tighten the screws on the front of the unit.
- 8 Reconnect cables to the system monitor faceplate.
- 9 Set all five circuit breakers on the PDU to OFF (down). Reconnect the source of DC power.
- 10 One at a time starting with the breaker for the blower unit, set the circuit breakers on the PDU to ON (up). Make sure the green LED lights on the power supply unit(s) in each module.

Note: On initial power up the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.
- 11 Replace the pedestal grills in the front and rear.
- 12 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT7R51 Local Carrier Interface Card

Use this procedure to replace a Local Carrier Interface card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing and replacing a Local Carrier Interface card

- 1 Disable the Local Carrier Interface card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DISL loop**, where **loop** is the actual loop number of the Local Carrier Interface card.
- 2 Set the ENL/DIS switch to DIS.
- 3 Disconnect the cable from the Local Carrier Interface card faceplate.
- 4 Unlatch the card locking devices by squeezing the tabs and pulling the locking devices away from the card.
- 5 Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6 Set the replacement card ENL/DIS switch to DIS.
- 7 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 8 Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the card locking devices firmly against the faceplate to latch the card inside the module.

- 9 Set the replacement card ENL/DIS switch to ENL, the Local Carrier Interface card automatically starts the self-test
- 10 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 11. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Local Carrier Interface card.
- 11 Connect the cable to the Local Carrier Interface card faceplate connector.
- 12 Enable the Local Carrier Interface card. Load the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **ENLL loop**, where **loop** is the actual loop number of the Local Carrier Interface card.r.
- 13 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment suppliers' repair depot.

NT7R52 Remote Carrier Interface Card

Use this procedure to replace a Remote Carrier Interface card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing and replacing a Remote Carrier Interface card

- 1 Load Network and Peripheral Equipment Diagnostic Program LD 32. At the > prompt, type **LD 32** and press the Enter key to access the program.
- 2 Type **DSXP x**, where **x** is the Remote Carrier Interface card number, and press the Enter key to disable the card. The Remote Carrier Interface card is now disabled and you can remove it.
- 3 Unlatch the card locking devices by squeezing the tabs and pulling them away from the card.
- 4 Pull the card out of the IPE module or cabinet and place it into an antistatic bag away from the work area.
- 5 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 6 Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the card locking devices firmly against the faceplate to latch the card inside the module. The Remote Carrier Interface card automatically starts the self-test.

- 7 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 8. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Remote Carrier Interface card.
- 8 At the prompt in the LD 32 program, type **ENXP x**, where **x** is the Remote Carrier Interface card number, and press the Enter key to enable the card. If the upper most red LED on the Remote Carrier Interface card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated by LD 32 on the MMI terminal connected to the Remote Carrier Interface card. If the LED stays on, replace the card.
- 9 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment suppliers' repair depot.

NT8D01 Controller Card

Use this procedure to replace a controller card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Turn off power to the module:
 - With AC power, set the associated circuit breaker on the module power supply (MPDU) to OFF (down).

Note: If there are two circuit breakers on the MPDU, the top one is associated with the module power supply, the bottom one with the ringing generator.

 - With DC power, set the switch on the module power supply to OFF (down).
- 2 Software disable the controller card (and all cards connected to the controller):

LD 32

DSXP x "x" is the controller card number

- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Insert the replacement card into the vacated slot and hook the locking devices.
- 2 Turn on power to the module:
 - With AC power, set the associated circuit breaker on the MPDU to ON (up).
 - With DC power, set the switch on the module power supply to ON (up).
- 3 Watch the controller card as it runs a series of self-tests:
 - During the tests, the maintenance display on the card shows the code for each test running (see “HEX” in the *X11 System messages guide*). If the tests complete successfully, the display begins normal operation. If the card continuously fails a test, the code for that test is displayed.
 - When IPE cards are installed, the red LED on the faceplate remains lit for 2 to 5 seconds as a self-test runs. If the self-test completes successfully, the LED flashes three times and remains lit until the card is configured and enabled in software, then the LED goes out. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), replace the card.
- 4 Software enable and test the controller card (and all cards connected to the controller):

ENXP x

- If there is a problem, an NPR, NWS, or SDL system message may be produced and the red LED lights on the controller card.
 - If there is no problem, exit LD 32:

- 5 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D02, NT8D03, NT8D09, NT8D14, NT8D15, NT8D16 Intelligent Peripheral Equipment Card

Use this procedure to replace the following intelligent peripheral equipment (IPE) cards:

- NT5D11 Line Side T1
- NT5D60AA CLASS Modem Card
- NT5K02 Flexible Analog Line Card
- NT5K07 Universal Trunk Card
- NT5K17 Direct Dial Inward Trunk Card
- NT5K18 Central Office Trunk Card
- NT5K19 E&M Trunk Card
- NT5K20 Tone Detector Card
- NT5K36 Direct Inward/Direct Outward Dial Trunk Card
- NT5K48 Tone Detector Card
- NT5K70 Central Office Trunk Card
- NT5K71 Central Office Trunk Card
- NT5K72 E&M Trunk Card
- NT5K82 Central Office Trunk Card
- NT5K83 E&M Trunk Card
- NT5K84 Direct Inward Dial Trunk Card
- NT5K90 Central Office Trunk Card
- NT5K93 Central Office Trunk Card
- NT5K96 Analog Line Card
- NT5K99 Central Office Trunk Card
- NT8D02 Digital Line Card
- NT8D03 Analog Line Card
- NT8D09 Analog Message Waiting Line Card

- NT8D14 Universal Trunk Card
- NT8D15 E&M Trunk Card
- NT8D16 Digitone Receiver (DTR) Card

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Software disable the card:

LD 32

DISI l s c “l s c” are loop, shelf, and card numbers

You will see “NPR011” on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

- 2 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set jumpers on the following replacement cards the same as on the card you removed:

NT8D14 Universal Trunk Card

NT8D15 E&M Trunk Card

To check settings, see *Circuit card installation and testing* (553-3001-211).

- 2 Insert the replacement card into the vacated slot and hook the locking devices.

Note: When IPE cards are installed, the red LED on the faceplate remains lit for 2 to 5 seconds as a self-test runs. If the self-test completes successfully, the LED flashes three times and remains lit until the card is configured and enabled in software, then the LED goes out. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), replace the card.

3 Software enable the card:

ENLC l s c

- When the process is complete, you will receive a system response.
- Exit LD 32:

4 Test the card:

LD 30

SHLF l s

Note: This command tests every card on the designated shelf.

- If there is a problem, an NPR system message is generated and the red LED(s) on the faceplate of the card will remain lit.
- If there is no problem, exit LD 30:

5 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D04 Superloop Network Card, QPC414 Network Card

Use this procedure to replace a superloop network card or network card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

All services on a loop are interrupted while the loop is disabled.

Removing equipment

- 1 Check the status of each loop on the network or superloop network card:

LD 32

STAT loop “loop” is a loop number

- If the response is **DSBL** for the loop(s), go to Step 2.
- If there are responses other than **DSBL**, see “LD 32” in the *X11 input/output guide* for an interpretation.

- 2 Set the ENB/DIS switch to DIS.
- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.

Note: On a replacement QPC414, set jumpers the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Connect cables to the replacement card.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable each loop on the card:

ENLL loop

- When the process is complete, you will receive a system response.
- The card is tested automatically when all loops are enabled.
- If there is a problem, an NWS system message is generated and the red LED on the faceplate of the card will flash (on the NT8D04) or be steadily lit (on the QPC414).
- If there is no problem, exit LD 32:

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D17 Conference/TDS Card

The conference/TDS card provides conference functions on one loop and both tone and digit switch (TDS) and multifrequency sender (MFS) functions on a second loop. Use this procedure to replace a conference/TDS card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Software disable the conference/TDS card:

LD 34 or LD 38 or LD 46

DISX loop

In LD 38 “loop” is the conference loop that is the odd loop of the conference/TDS loop pair. In LD 34 and LD 46 “loop” is the TDS/MFS loop that is the even loop of the conference/TDS loop pair.

Note: You must use the command DISX to disable both loops and all hardware functions. Disabling loops with the command DISL prevents software from using the loops but does not disable the card.

- 2 Set the ENB/DIS switch to DIS.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches and jumpers on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

- 3 Insert the replacement card into the vacated slot and hook the locking devices. Both red LEDs should flash three times and remain lit if the card is good.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable the card:
 ENLX loop This prompt is available in LD 34, LD 38, and LD 46. Use the appropriate loop number (see Step 1 in "Removing equipment" on page 167).

Note: You must enable the card with the command ENLX. Enabling the loops with the command ENLL does not enable the card.

- 6 Test each loop on the card (when each test completes, enter ****):
 - Test TDS capability:
 LD 34
 TDS loop "loop" is an even loop number
 - Test Conference capability:
 LD 38
 CNFC loop "loop" is an odd loop number
 - Test MFS capability:
 LD 46
 MFS loop "loop" is an even loop number
 - If there is a problem, a TDS, CNF, or MFS system message is generated and the appropriate red LED lights on the card faceplate.
- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D18 Network/DTR Card

The network/DTR card provides network and peripheral controller functions along with Digitone receiver capability. Use this procedure to replace a network/DTR card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

All services on a loop are interrupted while the loop is disabled.

Removing equipment

- 1 Check the status of the superloop:

LD 32

STAT 28 the superloop must be loops 28–31

- If the response is **DSBL** for all loops, go to Step 1 on page 170.
- If there are responses other than **DSBL**, see “LD 32” in the *X11 input/output guide* for an interpretation.

- 2 Set the ENB/DIS switch to DIS.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1** Set the ENB/DIS switch to DIS on the replacement card.
- 2** Insert the replacement card into the vacated slot and hook the locking devices.
- 3** Set the ENB/DIS switch to ENB on the replacement card.
- 4** Software enable the superloop:

ENLL 28

- When the process is complete, you will receive a system response.
- If there is a problem, an NPR system message is generated and the red LED on the faceplate of the card lights.
- If there is no problem, exit LD 32:

- 5** Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D19 Memory/Peripheral Signaling Card

Use this procedure to replace a memory/peripheral signaling card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the NT8D19 card is removed.

- 1 Unhook the locking devices on the memory/peripheral signaling card; pull it out of the card cage.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 The system will sysload when the NT8D19 card is inserted.
Press the reload button on the QPC687 CPU Card to activate a clean sysload.
- 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D22 System Monitor

Use this procedure to replace the system monitor.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

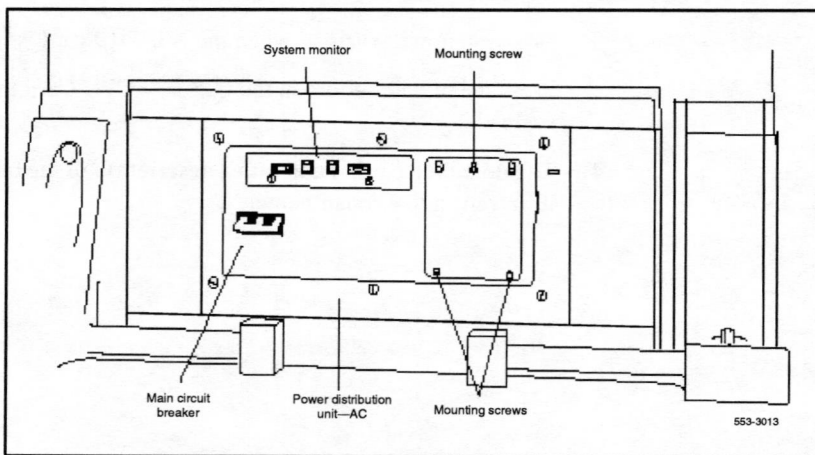
Removing equipment

CAUTION

Be sure to follow the steps in this procedure in the order shown. Removing the system monitor before disconnecting cables may result in loss of power and interruption of telephone service.

- 1 Remove the grill on the rear of the pedestal.
- 2 Tag and disconnect cables to the system monitor. Figure 17 shows the location of the system monitor in the rear of an AC-power pedestal.

Figure 17
NT8D22 System Monitor in an AC-power pedestal



- 3 Loosen the two screws on the card and pull it out of the slot.

Note: If a slave is removed, the master considers that slave and all slaves with a higher address as disabled. For example, if the slave designated "XSM 2" is disabled, the master also reports slaves 3, 4, and up are disabled.

Installing equipment

- 1 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 2 Insert the replacement card into the vacated slot and tighten the two screws on the front of the card.
- 3 Connect cables to the replacement card.
- 4 Replace the grill on the rear of the pedestal.
- 5 Test the system monitor:

LD 37

STAT XSM

- If a single or master system monitor was replaced successfully, you will receive system message "PWR000 XSMC 00 0 0."
- If a slave was replaced successfully, you will receive "PWR053 XSMC xx 0 0" ("x" is the system monitor address).
- If there is a problem with a slave, you will receive system message "PWR013 XSMC xx 0 0."
- If there is no problem, exit LD 37:

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D41 Dual or Quad Port Serial Data Interface card

The serial data interface (SDI) paddle board attaches to the rear of the backplane in an NT8D11 CE/PE or NT6D39 CPU/Network Module. Use this procedure to replace an SDI paddle board.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

If the system terminal is assigned to the SDI being replaced, assign it to another port before this SDI is disabled.

Removing equipment

- 1 Software disable each port on the SDI paddle board:

LD 37

DIS TTY x "x" is the number of the interface device attached to the port

- 2 Remove the rear cover on the module.
- 3 Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
- 4 Set the ENB/DIS switch to the disable position (down) on the paddle board.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 5 Tag and disconnect cables to the paddle board you are removing (connector J1 for port 1, connector J2 for port 2).
- 6 Pull the paddle board out of the connector on the backplane.

Installing equipment

- 1 Set the ENB/DIS switch to the disable position (down) on the replacement paddle board.
- 2 Set option switches on the replacement paddle board the same as on the board you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3 Plug the replacement paddle board into the vacated connector on the backplane.
- 4 Connect cables to the replacement paddle board.
- 5 Set the ENB/DIS switch to the enable position (up) on the replacement paddle board.
- 6 Replace the I/O safety panel. Replace the rear cover on the module.
- 7 Software enable and test each port on the paddle board:

ENL TTY x

TTY x

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D46AC Thermostat Harness

Use this procedure to replace the thermostat harness located in the top cap of each column.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disconnect the system monitor from the circuit breaker system:

Note: For system option 21A, go to the note in Step 2.

- Remove the grill on the rear of the column pedestal.
- Loosen the two screws on the system monitor and pull it out a few inches.

CAUTION

If the system monitor is not unseated, column operation will shut down when the thermostat harness is disconnected.

- 2 Disconnect power to the top cap:

- Remove the rear cover on the module below the top cap.
- Remove the I/O safety panel over the backplane.

Note: For system option 21A, disconnect the cable to connector J3 on the NT7D15 System Monitor at this point.

- At the top of the rear of the module, disconnect the connector from the module power harness.
- Disconnect the pin headers on connector J2 on the backplane; disconnect the ribbon cable connector.

3 Remove the top cap:

- Remove air exhaust grills at the front and rear of the top cap (see Figure 18). Pull forward on the two clips underneath the front edge of each grill and lift up to remove the grill.
- Use a 5/16" socket wrench to remove the six bolts that secure the top cap and perforated panel (see Figure 19). Lift off the top cap only.

Figure 18
Air exhaust grills on the top cap

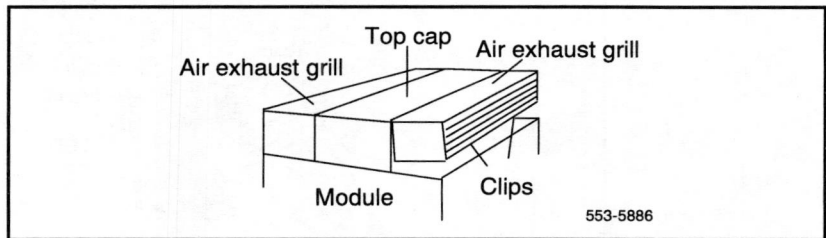
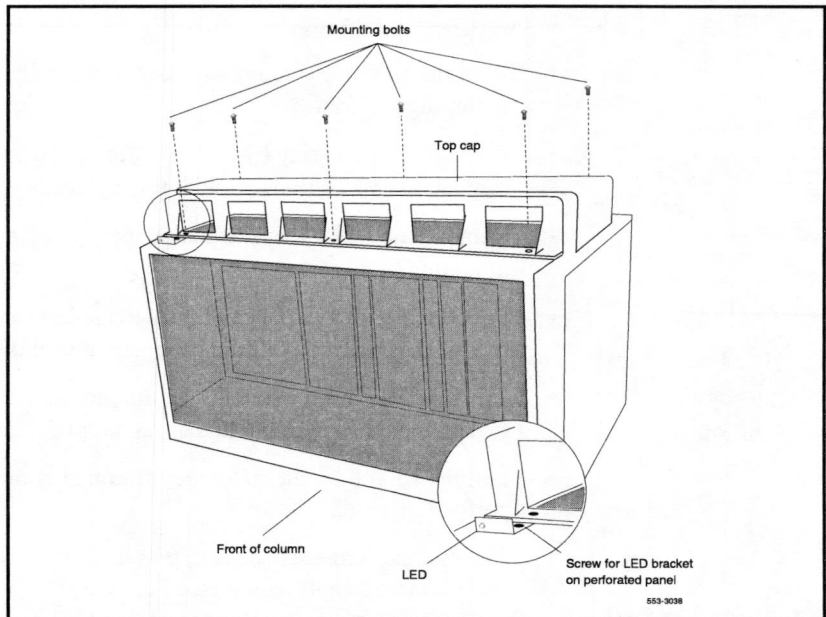


Figure 19
Top cap assembly

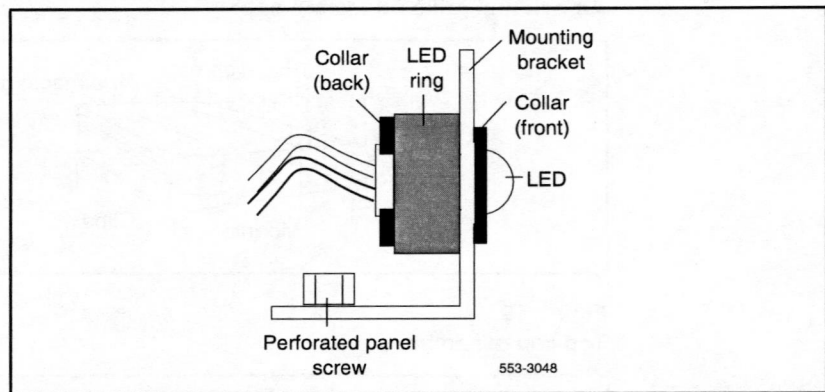


4 Remove the thermostat harness:

Note: The column LED and LED wiring are part of the thermostat harness.

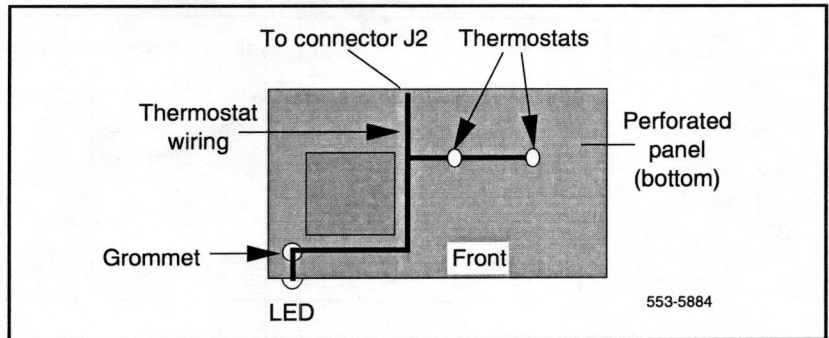
- Pull the LED ring away from the LED mounting bracket (see Figure 20). You may need to loosen it with a standard screwdriver.

Figure 20
Mounting for the column LED



- Push the LED back completely out of the collar on the LED mounting bracket.
- Remove the LED ring by pulling it forward over the LED. Keep the ring handy; you will use it with the replacement equipment.
- Remove the screw that secures the perforated panel at the LED mounting bracket.
- Slide the perforated panel slightly to the left (looking at it from the rear of the column). Lift the panel and turn it over.
- Clip all cable ties that secure the thermostat harness. Be careful not to damage other wiring (such as the air probe harness).
- Pull the LED through the rubber grommet at the front of the perforated panel.
- Remove the screws (two each) that secure the thermostats. Remove the thermostats and wiring (see Figure 21).

Figure 21
Thermostat harness



Installing equipment

- 1 Install the replacement thermostat harness:
 - Position the replacement thermostats and install the screws.
 - Push the LED through the rubber grommet.
 - Route the thermostat wiring on the perforated panel. At the rear edge of the panel, route the wires with wiring for the air probe harness (or top cap fan in system option 21A). Secure loose wiring to the perforated panel with cable ties.
- 2 Turn the perforated panel over. Slide it slightly to the right (at the rear of the column) so it is in a secure position. Position wiring from the perforated panel so it rests in the cable well next to the orange connector at the rear of the module (see Figure 22). Position the perforated panel and install the screw that secures it at the LED mounting bracket.
 - Slide the LED ring over the LED (see Figure 23). The ring will hang loosely at this point.
 - Gently push the LED forward completely through the collar on the LED mounting bracket.
 - Push the LED ring into position over the back of the collar and tight against the LED mounting bracket.

Figure 22
Routing the thermostat harness from the top cap

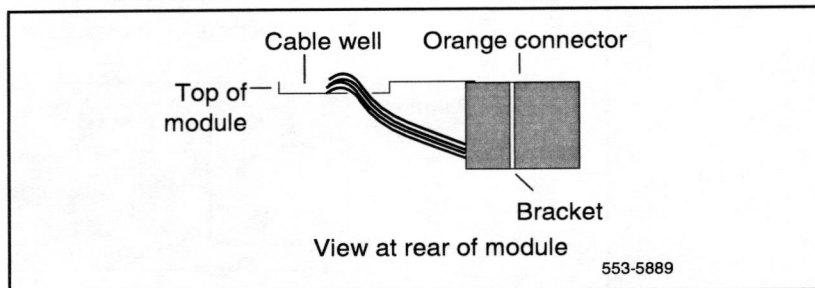
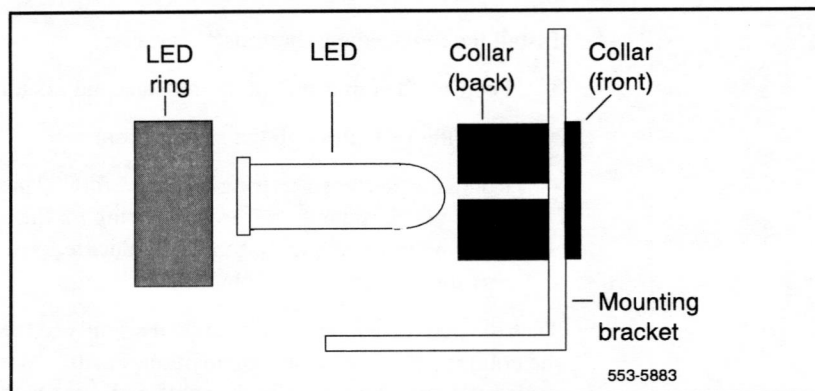


Figure 23
Installing the column LED

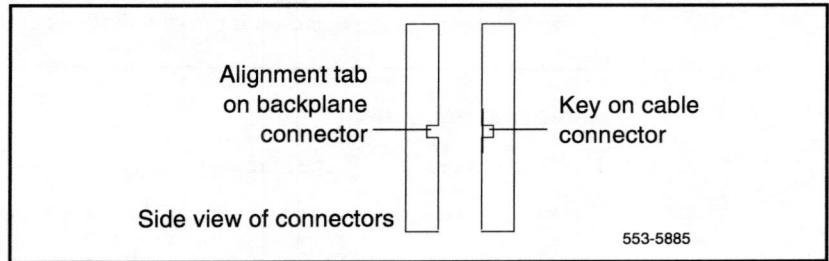


- 3 Install the top cap:
 - Position the top cap and install the six bolts that secure the top cap and perforated panel.
 - Install the air exhaust grills at the front and rear of the top cap.

4 Reconnect power to the top cap:

- Connect the ribbon cable connector to connector J2 on the backplane. Line up the alignment tab on the connector and snap on the pin headers to position the connector correctly (see Figure 24).

Figure 24
Aligning the thermostat harness connector



- Connect the orange connector to the module power harness.

Note: For system option 21A, reconnect the cable to connector J3 on the system monitor at this point.

- Replace the rear cover on the module.

5 Reconnect the system monitor to the circuit breaker system:

Note: For system option 21A, skip this step (the system monitor is already connected).

- Push the system monitor into position and tighten the screws.
- Replace the grill on the pedestal.

6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D46AM, NT8D46DC Air Probe Harness

Use this procedure to replace the air probe harness located in the top cap of each column (except option 21A).

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disconnect the air probe harness plug:
 - Remove the rear cover on the module below the top cap.
 - Remove the I/O safety panel over the backplane.
 - At the top of the rear of the module, disconnect the orange connector from the module power harness.
- 2 Remove the top cap:
 - Remove air exhaust grills at the front and rear of the top cap (see Figure 25). Pull forward on the two clips underneath the front edge of each grill and lift up to remove the grill.
 - Use a 5/16" socket wrench to remove the six bolts that secure the top cap and perforated panel (see Figure 26). Lift off the top cap.

Figure 25
Air exhaust grills in the top cap

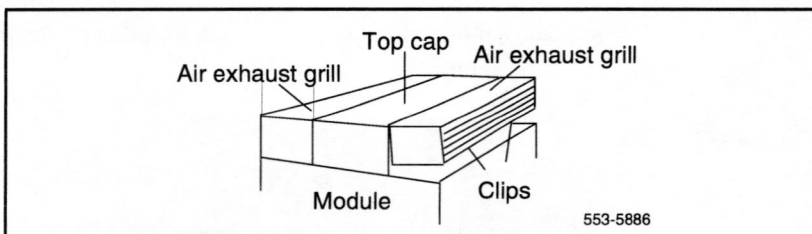
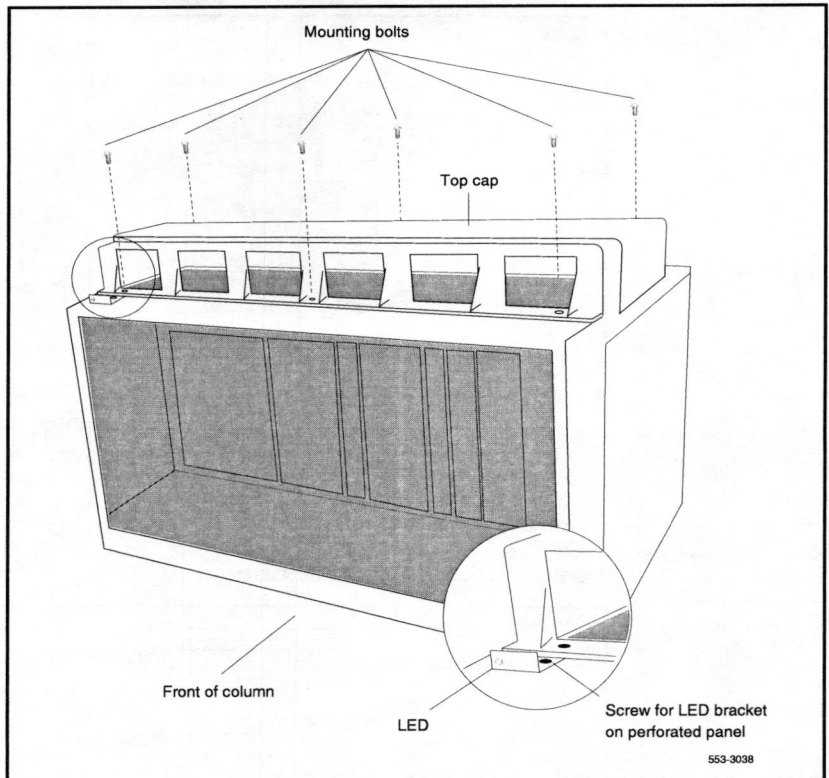


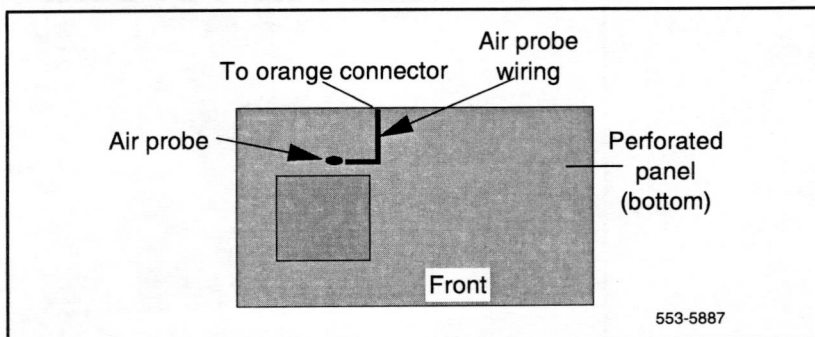
Figure 26
Top cap assembly



3 Remove the air probe harness:

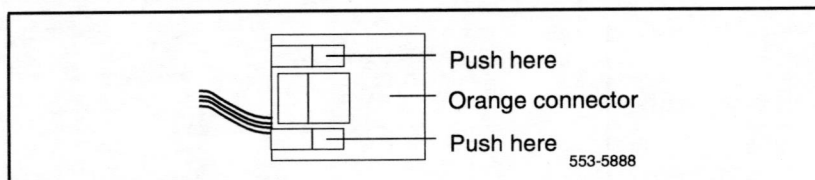
- Remove the screw that secures the perforated panel at the LED mounting bracket.
- Slide the perforated panel slightly to the left (looking at it from the rear of the column). Lift the panel and turn it over.
- Pull the air probe out of the clip holder (see Figure 27).
- Clip cable ties that secure the air probe wiring. Be careful not to damage other wiring (such as the thermostat harness).

Figure 27
Air probe harness



- Remove the orange connector from the right-angle bracket at the top of the module. Simultaneously push the four small snaps (two on each side) on the connector to release it from the bracket (see Figure 28).

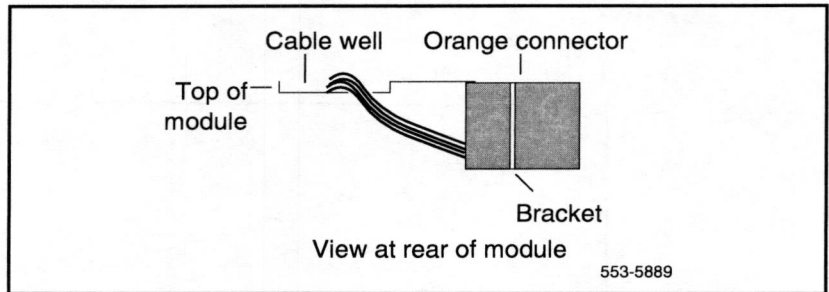
Figure 28
Connector for the air probe harness



Installing equipment

- 1 Install the replacement air probe harness:
 - Gently push the air probe into the clip holder.
 - Route the air probe wiring on the perforated panel. At the rear edge of the panel, route the wires with wiring for the thermostat harness. Secure loose cabling to the perforated panel with cable ties.

- Turn the perforated panel over. Slide it slightly to the right (at the rear of the column) so it is in a secure position. Position wiring from the perforated panel so it rests in the cable well next to the orange connector at the rear of the module (see Figure 29).

Figure 29**Routing the air probe harness from the top cap**

- Insert the orange connector into the right-angle bracket at the top of the module. Simultaneously push the four small snaps on the connector to insert it.
- 2 Install the top cap and perforated panel:
 - Position the perforated panel and install the screw that secures it at the LED bracket.
 - Position the top cap and install the six bolts that secure the top cap and perforated panel.
 - Install the air exhaust grills at the front and rear of the top cap.
 - 3 Reconnect the air probe harness plug:
 - Connect the orange connector to the module power harness.
 - Replace the I/O safety panel.
 - Replace the rear cover on the module.
 - 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

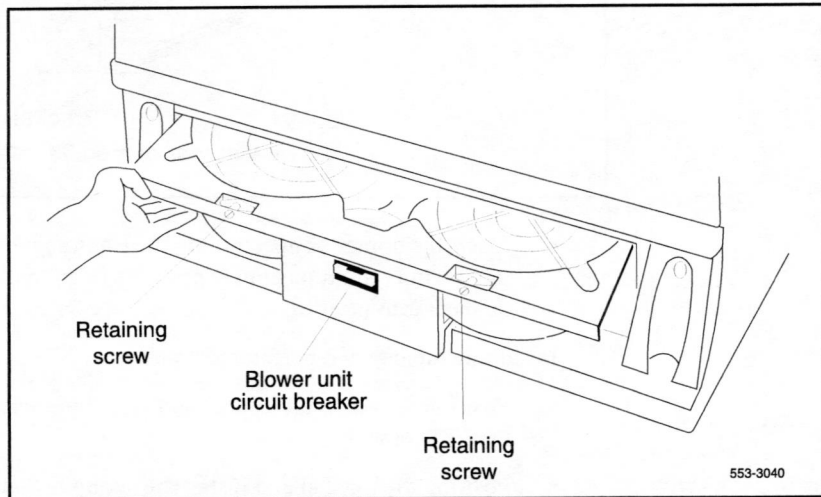
NT8D52AB, NT8D52DD Pedestal Blower Unit

Use this procedure to replace a blower unit.

Removing equipment

- 1 Remove the front pedestal grill and set it aside. Figure 30 shows the blower unit and its location in the front of the pedestal.

Figure 30
NT8D52 Blower Unit



- 2 Turn off power to the blower unit:
 - With AC power, set the circuit breaker on the front of the unit to OFF (down).
 - With DC power, set the toggle switch on the front of the unit to OFF (left).

WARNING

Impellers in the blower unit do not stop instantly when the power is turned off. Wait *two full* minutes before you remove the unit.

- 3 Loosen the two screws on the front of the blower unit by turning them counterclockwise.
- 4 Grasp the lip at the top edge of the blower unit. Slide the unit out of the glides and onto the bottom ledge of the pedestal. Lift the unit out of the pedestal.

Note: Store the blower unit in an upright position.

Installing equipment

- 1 Set the replacement blower unit on the bottom ledge of the pedestal.
- 2 Tilt the back of the blower unit up slightly so it will slide into the pedestal glides (you may need to lift the unit). Gently push the unit into position.
- 3 Tighten the screws on the front of the unit.
- 4 Turn on power to the blower unit:
 - With AC power, set the circuit breaker to ON (up).
 - With DC power, set the toggle switch to ON (right).

Note: On initial power up the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.

- 5 Fit the grill into the holes in the bottom ledge of the pedestal. Push the grill back into a locked position.
- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D53AB Power Distribution Unit AC

Use this procedure to replace the power distribution unit (PDU) for AC-powered systems.

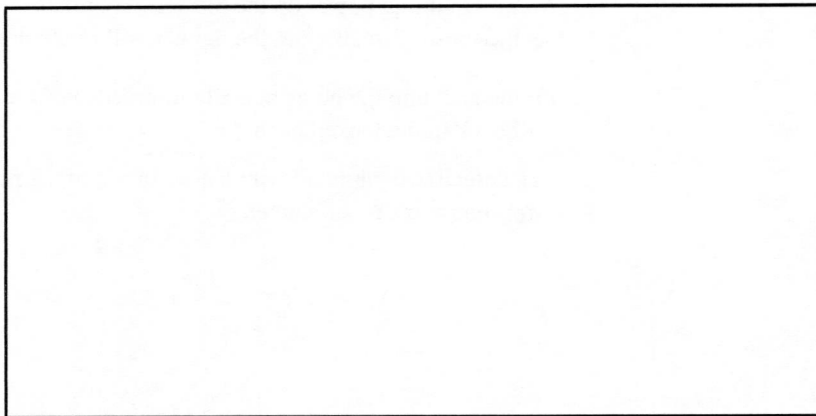
WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Turn off power at the distribution box. If the column is not hardwired, unplug the power cable.
- 2 Remove the grill on the rear of the pedestal. Figure 31 shows the location of the unit in the rear of the pedestal.

Figure 31
NT8D53AB Power Distribution Unit AC



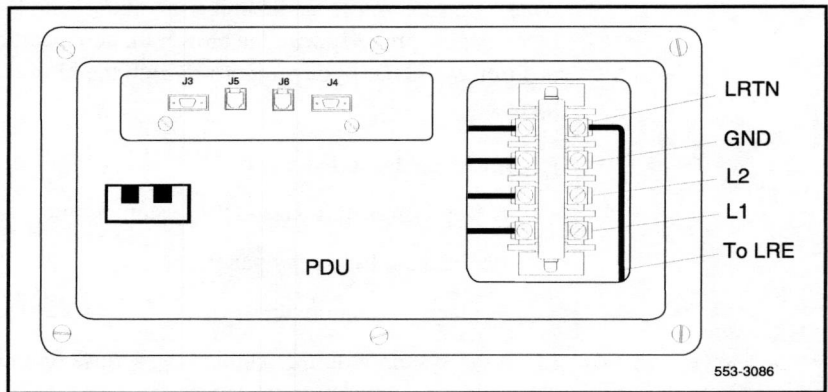
- 3 Loosen the three mounting screws that secure the field wiring access plate. Lift the plate over the screws and set it aside.

- 4 Tag and disconnect wiring to the LRTN, GND, L2, and L1 connections on the right side of the field wiring terminal (see Figure 32). Push all the wires down into the empty area under the pedestal.

CAUTION

Label wires carefully. They must be reconnected correctly or the system may be damaged.

Figure 32
Connections at the field wiring terminal



- 5 Tag and disconnect cables to the NT8D22 System Monitor. Loosen the two retaining screws on the system monitor. Remove the card.
- 6 Disconnect cables to the module above the pedestal (module 0):
 - Remove the rear cover on the module.
 - Remove the I/O safety panel over the backplane in the module.
 - Disconnect the power plug (J1) and system monitor ribbon cable to the module.

Note: To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

- 7 Remove the six screws that position the PDU. Carefully pull the unit straight forward out of the pedestal.

Installing equipment

- 1 Set the main circuit breaker on the replacement PDU to OFF (down).
- 2 Position the replacement PDU and gently push it into the pedestal.

Note: Be sure you push the unit straight back, so the connector on the rear will seat properly with the blower unit connector. It may be easier to position the PDU if you temporarily pull the blower unit out several inches.

- 3 Reconnect cables to module 0:
 - Attach power plug J1 and the system monitor cable.
 - Replace the I/O safety panel.
 - Replace the rear cover.
- 4 Insert the system monitor. Tighten the screws on the card. Reconnect cables to the system monitor faceplate.
- 5 Connect wiring to the right side of the field wiring terminal.
- 6 Position the field wiring access plate over the three mounting screws. Tighten the screws.
- 7 Turn on power at the distribution box or plug in the power cable.
- 8 Set the main circuit breaker to ON (up).
- 9 Replace the pedestal grill.
- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D53AD Power Distribution Unit

Use this procedure to replace the power distribution unit (PDU); used in option 21A.

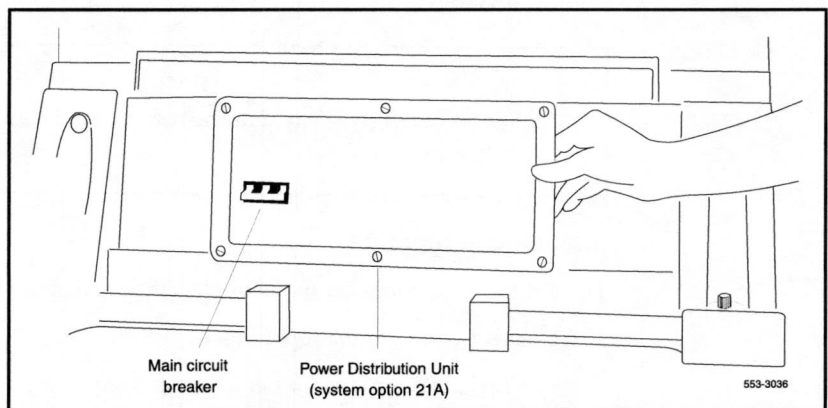
WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Set the circuit breaker on the PDU to OFF (down). Figure 33 shows the location of the unit in the rear of the pedestal.

Figure 33
NT8D53AD Power Distribution Unit (option 21A)



- 2 Unplug the power cable from the external outlet.
- 3 Disconnect the power cable from the pedestal to the module:
 - Remove the rear cover on the module.
 - Remove the I/O safety panel over the backplane.
 - Disconnect the power plug at connector J1.

Note: To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

- 4 Remove the six screws that position the PDU and lift the unit out of the pedestal.
- 5 Remove the grill on the rear of the pedestal.
- 6 Tag and disconnect wiring to the rear of the panel:
 - Disconnect cables from the system monitor to connectors C1 and C2.
 - Remove the cover over the terminal block (TB1). Disconnect wiring from the power cord to connectors L1 and L2 on the terminal block.
 - Disconnect the ground wiring from the ground bolt from inside the pedestal.

CAUTION

Label wires carefully. They must be reconnected correctly or the system may be damaged.

Installing equipment

- 1 Set the circuit breaker on the replacement panel to OFF (down).
- 2 Connect wiring to the replacement panel:
 - Install the ground bolt and wiring inside the pedestal.
 - Connect wiring from the power cord to connectors L1 and L2 on the terminal block. Replace the cover over the terminal block.
 - Connect cables from the system monitor to connectors C1 and C2.

- 3 Reconnect the power cable from the pedestal to the module:
 - Attach the power plug at connector J1.
 - Replace the I/O safety panel.
 - Replace the rear cover on the module.
- 4 Position the replacement panel and replace the screws.
- 5 Plug the power cable into the external outlet.
- 6 Set the circuit breaker on the panel to ON (up).
- 7 Replace the pedestal grill.
- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D56AA, NT8D56AC, NT8D57 Module Power Distribution Unit

Use this procedure to replace the following module power distribution units (MPDUs):

- NT8D56AA single-breaker MPDU for the NT8D29 CE Power Supply AC
- NT8D56AC single-breaker MPDU for the NT7D14 CE/PE Power Supply AC
- NT8D57 dual-breaker MPDU for the NT8D06 PE Power Supply AC and NT8D21 Ringing Generator AC

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Remove the rear grill on the column pedestal. Set the main circuit breaker to OFF (down).

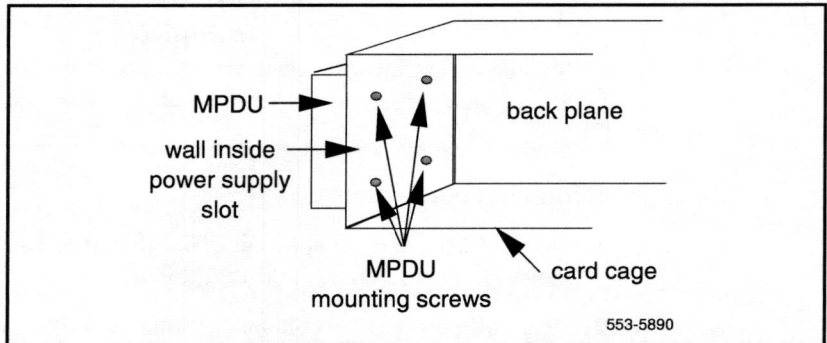
CAUTION

Shutting off the main circuit breaker disables the entire column.

- 2 Remove the I/O safety panel over the backplane.
- 3 Tag and disconnect the power plugs to the MPDU.
- 4 Remove the metal plate covering the MPDU in the front of the module by removing the mounting screw in each corner.
- 5 Unhook the locking devices on the power supply next to the MPDU. Pull the power supply out of the card cage.

- 6 Remove the mounting screws for the MPDU; the screw-heads are in the wall of the power supply slot (see Figure 34). (Be careful—do not let the screws fall into the module below.) Lift the unit out of the module.

Figure 34
Mounting screws for the MPDU



Installing equipment

- 1 Set the circuit breaker(s) on the replacement MPDU to OFF (down).
- 2 Position the replacement MPDU in the module. Install the mounting screws through the wall of the power supply slot.
- 3 Reinsert the power supply and hook the locking devices.
- 4 Position the metal plate in front of the MPDU and install the mounting screw in each corner.
- 5 Connect the power plugs to the rear of the MPDU.
- 6 Position the I/O safety panel. Tighten the screws.
- 7 Set the circuit breaker(s) on the replacement MPDU to ON (up).
- 8 Reset the main circuit breaker in the column pedestal to ON (up) and replace the pedestal grill.
- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D1103 CE/PE Module Card Cage

To replace a defective backplane in an NT8D11 CE/PE Module, you must replace the card cage. Use this procedure to replace the CE/PE Module card cage.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Unseat disks in the Floppy Disk Unit (FDU) or Small Systems Multi Disk Unit (SMDU) from the disk drives.
- 2 Turn off power to the column or the module power supply:
 - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D43 CE/PE Power Supply to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)
- 3 Remove the NT8D22 System Monitor in the rear of the pedestal. (*Do not* turn off the blower unit in the front of the pedestal.)

Note: Disconnect the RJ11 cables before you pull the system monitor out of the pedestal.

CAUTION

If the system monitor is not removed, the system may shut down.

- 4 Remove all cards from the module:
 - Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
- 5 Disconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 6 Remove the two mounting screws that secure the rear of the card cage to the module.
- 7 Remove the front cover plates on both sides of the card cage.
- 8 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

Installing equipment

- 1 Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2 Replace the front cover plates on both sides of the card cage.
- 3 Install the mounting screws at the rear of the card cage.
- 4 Reconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Connect all plugs, wires, and cables to the backplane.
 - Position the I/O safety panel. Tighten the screws.

- 5 Return cards to their slots. Reconnect all cables to faceplate connectors.
- 6 Reinstall the system monitor. Reconnect the RJ11 cables after it is installed.
- 7 Turn on power to the column or the module power supply:
 - With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply in the module.
- 8 Reinsert disks into the disk drive unit.
- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D1303 PE Module Card Cage

To replace a defective backplane in an NT8D13 Peripheral Equipment Module, you must replace the card cage. Use this procedure to replace the PE Module card cage.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disable the peripheral equipment (PE) shelf:

LD 32

DISS 1 s “1 s” are the loop and shelf numbers

If a second shelf is assigned to a loop, disable that shelf also:

DISS 1 s

- 2 Turn off power to the column or the module power supply and ringing generator (if equipped):
 - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D40 PE Power Supply and NT6D42 Ringing Generator to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)

- 3 Remove the NT8D22 System Monitor in the rear of the pedestal. (Do *not* turn off the blower unit in the front of the pedestal.)

Note: If this is the master system monitor, disconnect the RJ11 cables before you pull the system monitor out of the pedestal.

CAUTION

If the system monitor is not removed, the system may shut down.

- 4 Remove all cards from the module:
 - Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
- 5 Disconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 6 Remove the two mounting screws that secure the rear of the card cage to the module.
- 7 Remove the front cover plates on both sides of the card cage.
- 8 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

Installing equipment

- 1 Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2 Replace the front cover plates on both sides of the card cage.
- 3 Install the mounting screws at the rear of the card cage.

- 4 Reconnect cables, plugs, and wires from the module to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Connect all plugs, wires, and cables to the backplane.
 - Position the I/O safety panel. Tighten the screws.
- 5 Return cards to their slots. Reconnect all cables to connectors.
- 6 Reinstall the system monitor. If this is the master system monitor, reconnect the RJ11 cables after it is installed.
- 7 Turn on power to the column or the module power supply and ringing generator:
 - With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply and the ringing generator in the module.
- 8 Enable the shelf:
ENLS I s
If a second shelf is assigned to a loop, enable that shelf also:
ENLS I s
Exit LD 32:

- 9 Test the shelf by testing each loop with:
LD 30
SHLF I s
If there is a problem, an NWS system message is generated.
If there is no problem, exit LD 30:

- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D3403 CPU Module Card Cage

To replace a defective backplane in an NT8D34 CPU Module, you must replace the card cage. Use this procedure to replace the CPU Module card cage.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 The CPU on the backplane you are replacing must be inactive:
 - If you need to switch CPUs:
LD 35
SCPU
 - Set the NORM/MAINT switch to MAINT on the *active* CPU interface (IF) card. (This keeps the system from switching to the inactive CPU.)
 - Set the ENB/DIS switch to DIS on the *inactive* interface card.
- 2 If the multi disk unit (MDU) or floppy disk unit (FDU) is located in the module, move the unit to the other CPU module:
 - Remove floppy disks from the disk drives.
 - Tag and disconnect cables to the unit.
 - Unhook the locking devices on the unit; pull it out of the card cage.

CAUTION

If you are moving an MDU, pull it forward two or three inches, then wait *at least 10 seconds* before you remove the MDU from the card cage.

- Insert the unit in an acceptable slot in the other CPU module. See *Circuit card installation and testing* (553-3001-211) for slot assignments.
 - Return floppy disks to the disk drives.
 - Reconnect cables to the unit.
- 3** Turn off power to the column or the module power supply:
- With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D41 CE Power Supply to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)
- 4** Remove the NT8D22 System Monitor in the rear of the pedestal. (Do *not* turn off the blower unit in the front of the pedestal.)

Note: If this is the master system monitor, disconnect the RJ11 cables before you pull the system monitor out of the pedestal.

CAUTION

If the system monitor is not removed, the system may shut down.

- 5** Remove all cards from the module:
- Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.

- 6 Disconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 7 Remove the two mounting screws that secure the rear of the card cage to the module.
- 8 Remove the front cover plates on both sides of the card cage.
- 9 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

Installing equipment

- 1 Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2 Replace the front cover plates on both sides of the card cage.
- 3 Install the mounting screws at the rear of the card cage.
- 4 Reconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Position the I/O safety panel. Tighten the screws.
- 5 Return cards to their slots. Reconnect all cables to faceplate connectors.
- 6 Reinstall the system monitor. If this is the master system monitor, reconnect the RJ11 cables after it is installed.

- 7 Turn on power to the column or the module power supply:
 - With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply in the module.
- 8 If the MDU or FDU is located in the module, reinsert disks into the disk drive unit.
- 9 Enable the CPU:
 - Set the ENB/DIS switch to ENB on the inactive interface card.
 - Set the NORM/MAINT switch to NORM on the active interface card.

10 Test and switch CPUs:

TCPU

SCPU

If you are unable to test and switch CPUs, check the extenders:

STAT EXT

Enable any that are disabled:

ENL EXT x "x" is the number of the extender pair

**** exit LD 35

- 11 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D3503/NT8D3507 Network Module Card Cage

The NT8D3503 Network Module Card Cage uses BTUs, however, the NT8D3507 Network Module Card Cage does not use BTUs, it uses hybrid terminators that are an integral part of the backplane. To replace a defective backplane in an NT8D35 Network Module, you must replace the card cage. Use this procedure to replace the Network Module card cage.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disable the QPC441 3-Port Extender (3PE) Card by disabling the associated QPC215 Segmented Bus Extender (SBE) Card (the CPU associated with the SBE must be inactive):

LD 35 (or LD 135 for option 81 and 81C systems)

DIS EXT xxx

or

**DIS CNI core slot port
for option 81 and 81C**

Table 8 lists extender codes specified by "xxx"

refer to Table 5, Table 6, and Table 7

exit

Table 5
Typical CNI configurations

System	CNI card slot	Port	Network group
option 81C	12	0	Group 0
	12	1	Group 1
	13	0	Group 2
	13	1	Group 3
	14	0	Group 4
option 81	8	0	pre-configured as "group 5"
	8	1	Group 0
	9	0	Group 1
	9	1	Group 2
	10	0	Group 3
	10	1	Group 4

Note: Each port on the CNI card provides functions similar to one QPC215 SBE Card in option 71. You do not have to configure both ports on the CNI card.

Table 6
Option 81C NTND95AA cable connections to 3PE cards

Network group	Cable label	Connector housing	Connector position	3PE connector
0	CPU1-CNI-12A to 3PE-GRP0/1-J3	Group 0	H12	J3
0	CPU1-CNI-12C to 3PE-GRP0/1-J4	Group 0	H14	J4
1	CPU1-CNI-12D to 3PE-GRP1/1-J3	Groups 1 & 2	H10	J3
1	CPU1-CNI-12F to 3PE-GRP1/1-J4	Groups 1 & 2	H12	J4
2	CPU1-CNI-13A to 3PE-GRP2/1-J3	Groups 1 & 2	H14	J3
2	CPU1-CNI-13C to 3PE-GRP2/1-J4	Groups 1 & 2	H16	J4
3	CPU1-CNI-13D to 3PE-GRP3/1-J3	Groups 3 & 4	H10	J3
3	CPU1-CNI-13F to 3PE-GRP3/1-J4	Groups 3 & 4	H12	J4
4	CPU1-CNI-14A to 3PE-GRP4/1-J3	Groups 3 & 4	H14	J3
4	CPU1-CNI-14C to 3PE-GRP4/1-J4	Groups 3 & 4	H16	J4

Table 7
Option 81 CNI to 3PE connections—NTND14 cables

Backplane connection	Group	3PE shelf from Core 1 / from Core 0		3PE connection
8D	0	1	0	J3
8F	0	1	0	J4
9A	1	1	0	J3
9C	1	1	0	J4
9D	2	1	0	J3
9F	2	1	0	J4
10A	3	1	0	J3
10C	3	1	0	J4
10D	4	1	0	J3
10F	4	1	0	J4

Note: Backplane shroud designations are 18 through 8 from left to right and A through F from top to bottom.

- 2 Disable all network loops on the shelf by disabling the peripheral signaling card:

LD 32

DSPS x

Table 9 lists the loops represented by “x”
 exit LD 32

- 3 Disable all other cards that might be in the module, such as serial data interface (SDI) cards or primary rate interface (PRI) cards.

CAUTION

If the system terminal is assigned to an SDI that will be disabled, assign it to another port before the SDI is disabled.

Table 8
Extender codes

Extender number	From	To
0G0	CPU 0	Network Group 0
0G1	CPU 0	Network Group 1
0G2	CPU 0	Network Group 2
0G3	CPU 0	Network Group 3
0G4	CPU 0	Network Group 4
1G0	CPU 1	Network Group 0
1G1	CPU 1	Network Group 1
1G2	CPU 1	Network Group 2
1G3	CPU 1	Network Group 3
1G4	CPU 1	Network Group 4

Table 9
Network loop codes

Group/ shelf	Peripheral signaling card	Loops disabled/enabled		
0 / 0	0	0	—	15
0 / 1	1	16	—	31
1 / 0	2	32	—	47
1 / 1	3	48	—	63
2 / 0	4	64	—	79
2 / 1	5	80	—	95
3 / 0	6	96	—	111
3 / 1	7	112	—	127
4 / 0	8	128	—	143
4 / 1	9	144	—	159

- 4 If the multi disk unit (MDU) or floppy disk unit (FDU) is located in the module, unseat disks from the disk drives and move the MDU or FDU to another location.
- 5 Turn off power to the column or the module power supply:
 - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D41 CE Power Supply to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)
- 6** Remove the NT8D22 System Monitor in the rear of the pedestal. (Do *not* turn off the blower unit in the front of the pedestal.)

Note: If this is the master system monitor, disconnect the RJ11 cables before you pull the system monitor out of the pedestal.

CAUTION

If the system monitor is not removed, the system may shut down.

- 7** Remove all cards from the module:
- Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
- 8** Disconnect cables, plugs, and wires from the rear of the module to the backplane:
- Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 9** Remove the two mounting screws that secure the rear of the card cage to the bottom of the module.

- 10 Remove the front cover plates on both sides of the card cage.
- 11 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

Installing equipment

- 1 Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2 Replace the front cover plates on both sides of the card cage.
- 3 Install the mounting screws at the rear of the card cage.
- 4 Reconnect cables, plugs, and wires to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Connect all plugs, wires, and cables to the backplane.
 - Position the I/O safety panel. Tighten the screws.
- 5 Return cards to their slots. Reconnect all cables to connectors.
- 6 Reinstall the system monitor. If this is the master system monitor, reconnect the RJ11 cables after it is installed.
- 7 Turn on power to the column or the module power supply:
 - With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply in the module.
- 8 If the MDU or FDU is in the module, reinsert disks into the drive.

9 Software enable the following:

- Enable the 3PE by enabling the associated SBE:

LD 35 (or LD 135 for option 81 or 81C)

ENL EXT xxx

or

ENL CNI core slot port

- Enable the peripheral signaling card:

LD 32

ENPS x

- Enable any other disabled cards.

10 Test network loops:

LD 30

LOOP ALL

- If there is a problem, an NWS system message is generated.
- If there is no problem, exit LD 30:

11 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D3703 IPE Module Card Cage

To replace a defective backplane in an NT8D37 IPE Module, you must replace the card cage. Use this procedure to replace the IPE Module card cage.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Software disable the controller card (and all cards connected to the controller):

LD 32

DSXP x "x" is the controller card number

- 2 Turn off power to the column or the module power supply and ringing generator (if equipped):
 - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

WARNING

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D40 PE Power Supply and NT6D42 Ringing Generator to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)

- 3 Remove the NT8D22 System Monitor in the rear of the pedestal. (Do *not* turn off the blower unit in the front of the pedestal.)

Note: If this is the master system monitor, disconnect the RJ11 cables before you pull the system monitor out of the pedestal.

CAUTION

If the system monitor is not removed, the system may shut down.

- 4 Remove all cards from the module:
 - Tag and disconnect cables to all faceplate connectors.
 - Tag cards so they can be returned to the same slot. Remove cards.
- 5 Disconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
 - Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
 - Tag and disconnect all plugs, wires, and cables to the backplane.
- 6 Remove the two mounting screws that secure the rear of the card cage to the module.
- 7 Remove the front cover plates on both sides of the card cage.
- 8 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

Installing equipment

- 1 Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2 Replace the front cover plates on both sides of the card cage.
- 3 Install the mounting screws at the rear of the card cage.

- 4 Reconnect cables, plugs, and wires from the rear of the module to the backplane:
 - Connect all cables from the interior of the I/O assembly to the backplane.
 - Connect all plugs, wires, and cables to the backplane.
 - Position the I/O safety panel. Tighten the screws.
- 5 Return cards to their slots. Reconnect all cables to faceplate connectors.
- 6 Reinstall the system monitor. If this is the master system monitor, reconnect the RJ11 cables after it is installed.
- 7 Turn on power to the column or the module power supply and ringing generator:
 - With AC power, set the main circuit breaker in the pedestal to ON (up).
 - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply and the ringing generator in the module.
- 8 Software enable and test the controller card (and all cards connected to the controller):
ENXP x “x” is the controller card number
******** exit LD 32
- 9 Test the shelf by testing each loop:
LD 30
SHLF l s “l s” are the loop and shelf numbers
 - If there is a problem, an NWS system message is generated.
 - If there is no problem, exit LD 30:

- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

NT8D33 Small Systems Multi Disk Unit

Use this procedure to replace the small systems multi disk unit (SMDU).

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Enter the Equipment Data Dump program:
LD 43
- 2 Set the ENB/DIS switch to DIS on the faceplate of the NT9D34 Enhanced Mass Storage Interface (EMSI) card.
- 3 Remove the floppy disks from their disk drives.
- 4 Tag and disconnect the cable(s) to the faceplate of the SMDU.
- 5 Unhook the locking devices on the SMDU and gently pull the unit forward two or three inches. Wait at least 10 seconds, then pull the unit out of the card cage.

CAUTION

You must wait *at least 10 seconds* before you remove the SMDU from the card cage. This allows the hard disk to stop.

Installing equipment

- 1 Insert the replacement SMDU into the vacated slot and hook the locking devices.
- 2 Connect the cable(s) to the faceplate of the SMDU.
- 3 Install the floppy disks in the replacement SMDU.
- 4 Set the ENB/DIS switch to ENB on the EMSI card.
- 5 Restore data from the floppy disks to the hard disk. Enter:

RES

- 6 Test the SMDU:

LD 37

MSI 0

- If there is a problem, an IOD system message is generated.
- If there is no problem, exit LD 37:

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing NT9D19 68040 Call Processor (CP) Cards in systems equipped with NT5D61 IODU/C cards

Use this procedure to replace an NT9D19 68040 Call Processor (CP) card in systems equipped with NT5D61 IODU/C cards. For systems equipped with NT5D20 IOP/CMDU cards or NT6D63 IOP and NT6D64 CMDU cards, refer to “NT9D19 68040 Call Processor (CP) card” on page 225.

Note: This procedure may also be used to replace a 64 MB NT9D19 CP card with a 96 MB NT9D19 CP card.

WARNING

Replacing the CP card in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpretation of system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.

Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module for the CP card you are replacing. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The CP card you are replacing must be in the inactive Core. Check the status of the NT9D19 Call Processor cards:

LD 135

STAT CPU determine which CP card is active

If necessary, switch Cores:

SCPU switch Cores

******** exit LD 135

- 3 Set the NORM/MAINT switch on the NT9D19 Call Processor card to MAINT on the *active* Core.
- 4 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 5 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
 - Press and hold down the MAN RST button on the CP card on the inactive Core.
 - Set the NORM/MAINT switch to MAINT.
 - Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

Installing equipment

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert the Install Program diskette which corresponds with the NT9D19 (68040) Call Processor card.
- 3 Remove the current CP card and put it in a static bag and box.
- 4 Insert the CP replacement card into its vacated slot and hook the locking devices.
- 5 Press the MAN RST button on the replacement CP card.

6 At the Main Menu select **<u>** to go to the Install Menu.

```
Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
=====
                                MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1
System Software, Database and the PE-ROM (both CP and IOP ROM).
You will be prompted throughout the installation and given the
opportunity to quit at any time.

Please enter:
<CR>--> <u> - To Install menu.
        <t> - To Tools menu.
        <q> - Quit.

Enter choice > u
```

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- Insert the Keycode diskette when prompted and select **<a>** to continue with the keycode validation.

```
Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
=====

Please insert the diskette with the keycode file into the floppy
drive.

Please enter:
<CR>--> <a> - Continue with the keycode validation
        (the keycode diskette is in the floppy drive).
        <q> - Quit.

Enter Choice > a
```

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7 Select the following options in sequence from the Install Menu:

- | | |
|------------------|--------------------------|
| <g> | to reinstall CP software |
| <y> | to start installation |

<y>	to continue installation
<a>	to continue with ROM upgrade
<cr>	to return to the Install Menu

8 At the Install Menu, select the following options in sequence

<e>	to install CP-BOOTROM
<y>	to start installation
<y>	to continue installation
<a>	to continue with ROM upgrade
<cr>	to return to the Install Menu

9 **Remove the diskette** from the IODU/C.

10 Select the following options to quit:

<q>	to quit
<y>	to confirm quit
<a>	to reboot the system.

Note: The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

- 11** Following a successful dial tone test, perform the following basic sanity tests:

- Make sure calls can be placed
- Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

- 12** Press and hold down the MAN RST button on the CP card of the *inactive* Core.
- 13** While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.
- 14** Enable all CNI switches in the inactive Core.
- 15** Release the MAN RST button.
- 16** Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

- 17** Log into the system through the terminal, then check the status of the replacement CP card from the active side:

LD 135	load LD 135
STAT CPU	obtain the CPU status

- 18** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

TEST CPU the test causes a cold start on the inactive CPU

If the test results in:

CCED014 "Test failed because unable to enter SPLIT mode"

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

TEST CPU to test the CP card

- 19** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- 20** Check the status of the CPUs:

STAT CPU

- 21** Test the CPU.

TEST CPU

- 22** Check the status of the CNIs:

STAT CNI

- 23** Switch Cores and exit the program:

SCPU

exit LD 135

NT9D19 68040 Call Processor (CP) card

Use this procedure to replace an NT9D19 68040 Call Processor (CP) card in systems equipped with NT5D20 IOP/CMDU cards or NT6D63 IOP and NT6D64 CMDU cards. For systems equipped with NT5D61 IODU/C cards, refer to “Replacing NT9D19 68040 Call Processor (CP) Cards in systems equipped with NT5D61 IODU/C cards” on page 219.

Note: This procedure may also be used to replace a 64 MB NT9D19 CP card with a 96 MB NT9D19 CP card.

WARNING

Replacing the CP card in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpretation of system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.

Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module for the CP card you are replacing. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The CP card you are replacing must be in the inactive Core. Check the status of the NT9D19 Call Processor cards:

LD 135

STAT CPU determine which CP card is active

If necessary, switch Cores:

SCPU switch Cores

******** exit LD 135

- 3 Set the NORM/MAINT switch on the NT9D19 Call Processor card to MAINT on the *active* Core.
- 4 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 5 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
 - Press and hold down the MAN RST button on the CP card on the inactive Core.
 - Set the NORM/MAINT switch to MAINT.
 - Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

Installing equipment

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert disk A1 into the IOP/CMDU or CMDU.
- 3 Remove the current CP card and put it in a static bag and box.
- 4 Ensure the NORM/MAINT switch is set to MAINT, and insert the CP replacement card into its vacated slot and hook the locking devices.
- 5 Press the MAN RST button on the replacement CP card.

6 Select the following options in sequence from the Install Menu:

- | | |
|-------------------|-------------------------------|
| <g> | to reinstall CP software |
| <y> | to start installation |
| <y> | to continue installation |
| <a> | to continue with ROM upgrade |
| <cr> | to return to the Install Menu |

7 At the Install Menu, select the following options in sequence

- | | |
|-------------------|-------------------------------|
| <e> | to install CP-BOOTROM |
| <y> | to start installation |
| <y> | to continue installation |
| <a> | to continue with ROM upgrade |
| <cr> | to return to the Install Menu |

8 Remove the diskette from the IOP/CMDU or CMDU.

9 Select the following options to quit:

- | | |
|------------------|-----------------------|
| <q> | to quit |
| <y> | to confirm quit |
| <a> | to reboot the system. |

Note: The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

- 10 Following a successful dial tone test, perform the following basic sanity tests:

- Make sure calls can be placed
- Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

- 11 Press and hold down the MAN RST button on the CP card of the *inactive* Core.
- 12 While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.
- 13 Enable all CNI switches in the inactive Core.
- 14 Release the MAN RST button.
- 15 Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

- 16 Log into the system through the terminal, then check the status of the replacement CP card from the active side:

LD 135	load LD 135
STAT CPU	obtain the CPU status

- 17** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

TEST CPU the test causes a cold start on the inactive CPU

If the test results in:

CCED014 "Test failed because unable to enter SPLIT mode"

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

TEST CPU to test the CP card

- 18** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- 19** Check the status of the CPUs:

STAT CPU

- 20** Test the CPU.

TEST CPU

- 21** Check the status of the CNIs:

STAT CNI

- 22** Switch Cores and exit the program:

SCPU

**** exit LD 135

NT9D34 Enhanced Mass Storage Interface Card

Use this procedure to replace an enhanced mass storage interface (EMSI) card. See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Save the current data configuration to the disk drive unit:

LD 43

EDD execute datadump

******** exit LD 43

- 2 Disable the EMSI card:

- The associated CPU must be inactive. If you need to switch CPUs:

LD 35

SCPU

- Software disable the EMSI card:

LD 37

DIS MSI 0

- Set the ENB/DIS switch to DIS on the faceplate of the EMSI card.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 3 Tag and disconnect the cable(s) to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.
- 5 Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the EMSI card.

Installing equipment

- 1 Plug the data cartridge into the connectors on the component side of the replacement EMSI card. Install the screw that secures the cartridge.
- 2 Set the ENB/DIS switch to DIS on the replacement card.
- 3 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

CAUTION

Incorrect switch settings on an EMSI card can cause a system failure.

- 4 Insert the replacement card into the vacated slot and hook the locking devices.
- 5 Connect the cable to the replacement card.
- 6 Set the ENB/DIS switch to ENB on the replacement card.
- 7 Switch to the active CPU:

LD 35

SCPU

- 8 Test the EMSI card:

LD 37

MSI 0

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

- 9 Restore the current data configuration:

LD 43

RES

Note: If three system software disks are used, disks A1 and B1 must be installed in the disk drive units after the restore operation.

- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTBK51AA Downloadable D-Channel Daughterboard

Use this procedure to replace the Downloadable D-Channel Daughterboard (DDCH).

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

WARNING

The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

Removing the DDCH Daughterboard

- 1The DDCH can only be removed when it is disabled in software.
- 2Both ports of the associated DDP circuit card must be disabled.
- 3Disable the faceplate switch on the DDP.
- 4Remove the DDP and DDCH.

Installing the DDCH Daughterboard

Note 1: Test procedures require a 24-hour minimum bit error-rate testing before being used. Refer to the *ISDN PRI Description and Administration* NTP (553-2901-100) for these procedures.

Note 2: Dual DTI/PRI loops must be configured in software before defining DCH links.

Set the address for the DDCH; refer to Table 10 for DCH mode and address select switch settings. If a DDCH is present on a DDP card then an external D-Channel should NOT be connected to JC. If a DDCH is present, the LED "DCH" will light up.

Table 10
DCH mode and address select switch settings

Switch	Description	S3 switch setting
1-4	D-Channel Daughterboard Address	See Table 11 on page 235.
5-7	For future use	off
8	External DCH or Onboard DDCH	off - MSDL or DCHI card on - Onboard DDCH Daughterboard

1The DDCH can be mounted on any DDP card.

2Unpack and inspect the DDCH daughterboard.

3Push the four stand-offs on the DDCH daughterboard into the four corresponding mounting holes on the DDP.

Note: The DDCH daughterboard mounts to mate correctly with P2 and P3 on the DDP motherboard.

Table 11
DDCH daughterboard address select switch settings

Device Addr. ¹	Switch Setting			
0 ²	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Note 1: The maximum number of DCHI, MSDL, and DDCH devices in the system is 16. The Device Addresses are equivalent to the MSDL DNUM designations. For programming information on the MSDL, refer to NTPs *Multi-purpose Serial Data Link description* 553-3001-195 and *X11 input/output guide*.

Note 2: Device address 0 is commonly assigned to the System Monitor.

NTND01 Integrated CPU/Memory Card

Use this procedure to replace the integrated CPU/memory (ICM) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the ICM card is removed.

Removing equipment

- 1 Unhook the locking devices on the card; pull it out of the card cage.
- 2 Remove the ROM card from the ICM card:
 - On the top (component side) of the card, remove the screw and washer at each corner of the ROM card.
 - Gently unplug the ROM card from the pin connector.

CAUTION

When you remove the ROM card, do not touch other components on the ICM card.

Installing equipment

- 1 Install the ROM card on the replacement ICM card:
 - Plug the ROM card into the pin connector.
 - Install the screw and washer at each corner of the ROM card.
- 2 Insert the replacement ICM card into the vacated slot and hook the locking devices.

The system will sysload. Check system messages in the *X11 system messages guide*.

Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND02 Misc/SDI/Peripheral Signaling Card

Use this procedure to replace a misc/SDI/peripheral signaling (MSPS) card.

See the *X11 input/output guide* for a description of all maintenance commands and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the MSPS card is removed. An initialization will occur when the new card is installed.

Removing equipment

- 1 Software disable each serial data interface (SDI) port configured on the MSPS card:

LD 37

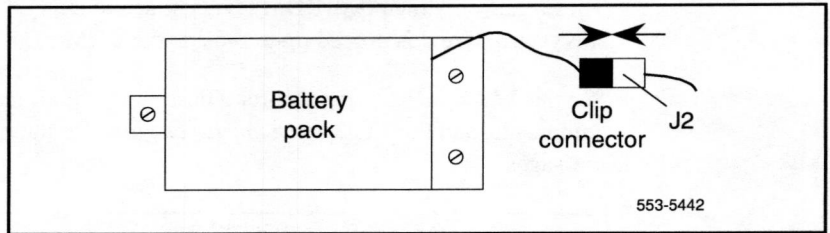
DIS TTY x "x" is the number of the interface device attached to the port

- 2 Set the ENB/DIS switch to DIS.
- 3 Disconnect the cable to the SDI connector from the faceplate of the card.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches and plugs on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3 Connect the wire from the battery pack assembly to the connector on the MSPS card (see Figure 35).

Figure 35
Connector for the battery pack assembly



- 4 Insert the replacement card into the vacated slot and hook the locking devices.
- 5 Connect the SDI cable to the replacement card.
- 6 Set the ENB/DIS switch to ENB on the replacement card.
- 7 Set the ENB/DIS switch on the NT8D18 Network/DTR Card to DIS, then back to ENB.
- 8 Press the initialize (INIT) button on the NTND01 ICM Card to activate a clean initialization.
- 9 Software enable and test each configured port on the MSPS card:

LD 37
ENL TTY x
TTY x

The response should be:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789"#\$%*!&()<>-.:.,? READY FOR INPUT

Anything entered on the keyboard will be echoed until END is input.

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND08, QPC939 ROM Card

These read-only memory (ROM) cards attach to the QPC579 CPU Function (FN) Card. Use this procedure to replace the ROM card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize or sysload, causing an interruption in call processing.

Removing equipment

- 1 To replace the ROM card you must disable and remove the function card. Disable the function card by disabling the associated QPC580 CPU Interface (IF) Card.

- This CPU must be inactive. If you need to switch CPUs:

LD 35 SCPU

- Set the NORM/MAINT switch to MAINT on the *active* interface card. (This keeps the system from switching to the inactive CPU.)
 - Set the ENB/DIS switch to DIS on the *inactive* interface card.
- 2 Disconnect the cable between the function and interface cards.
 - 3 Unhook the locking devices on the function card; pull it out of the card cage.

- 4 Gently unplug the ROM card from the connectors on the component side of the function card.

CAUTION

When you remove the ROM card, do not touch other components on the function card.

Installing equipment

- 1 Plug the replacement ROM card into the connectors on the component side of the function card.
- 2 Reinsert the function card and hook the locking devices.
- 3 Connect the cable between the function and interface cards.
- 4 Enable the function card by enabling the interface card.

- Set the ENB/DIS switch to ENB on the inactive interface card.
- Set the NORM/MAINT switch to NORM on both interface cards.

- 5 Test the CPU:

TCPU

SCPU

- If there is a problem, a CED system message is generated.
- If there is no problem, exit LD 35:

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND09, QPC583 Memory Card

Use this procedure to replace a memory card with a matching memory card.

Note: If you are replacing a 6 Mbyte memory card with a 12 Mbyte memory card, you must perform a system reload (sysload).

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

Removing equipment

1 Software disable the memory card:

- The associated CPU must be inactive. If you need to switch CPUs:

LD 35
SCPU

- All memory cards on this CPU must be disabled before the defective memory card is removed. For each memory card:

DIS x “x” is a two-digit number—the first digit is the associated CPU interface card and the second is the memory card number

CAUTION

All memory cards on this CPU must be software disabled to avoid the possibility of a sysload.

- 2 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Insert the replacement card into the vacated slot and hook the locking devices.

- 2 Test and enable memory cards:

- Test the replacement card:

MEM x

- When the process is complete, you will receive a system response.
- Enable each disabled memory card:

ENL x

- 3 Test the CPU:

TCPU

- If there is a problem with one of the memory cards, a CED system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 35:

- 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND10, QPC581 Changeover and Memory Arbitrator Card

Use this procedure to replace a changeover and memory arbitrator (CMA) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

Removing equipment

1 Software disable the CMA:

- The associated CPU must be inactive. If you need to switch CPUs:

LD 35
SCPU

- All memory cards served by the CMA must be disabled before the CMA can be disabled. For each memory card:

DIS x "x" is a two-digit number—the first digit is the associated CPU card and the second is the memory card number

- Disable the CMA:

DIS CMA x "x" is the CMA number—0 or 1

- Set the NORM/MAINT switch to MAINT on the *active* QPC580 CPU Interface (IF) Card.

- 2 Set the ENB/DIS switch to DIS on the CMA.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 3 Tag and disconnect cables to the card you are removing; disconnect the top cable first.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.

Note: On an NTND10 card, for 768 K memory connect pins 2 and 3 on the jumper at J3. For 1 M to 4 M memory connect pins 1 and 2.

- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Connect cables to the replacement card; connect the bottom cable first.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable any cards that were disabled:

- To enable the CMA:

ENL CMA x

- To enable each memory card:

ENL x

- Set the NORM/MAINT switch to NORM on both interface cards.

6 Test the CMA:

TCPU

- A CED065 message may be generated from this test. If this occurs, enter **TCPU** again to clear this condition.
- If the replacement CMA is faulty, further system messages will be generated and the red LED will light on the faceplate of the card.
- If there is no problem, exit LD 35:

7 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND15, NT8D68 Floppy Disk Unit

Use this procedure to replace the floppy disk unit (FDU).

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 To software disable the FDU, log in on a system terminal. At the > prompt enter:
DIST
(This command is entered directly through the Overlay Loader program. No other program should be active.)
- 2 Set the ENB/DIS switch to DIS on the associated QPC742 Floppy Disk Interface (FDI) Card.
- 3 Remove the disks from the FDU.
- 4 Tag and disconnect the cable(s) to the faceplate of the FDU.
- 5 Unhook the locking devices on the FDU and pull the unit out of the card cage.

Installing equipment

- 1 Insert the replacement FDU into the vacated slot and hook the locking devices.
- 2 Connect the cable(s) to the replacement FDU.
- 3 Install the disks in the replacement FDU.
- 4 Set the ENB/DIS switch to ENB on the associated FDI.

- 5 To software enable the FDU, at the > prompt enter:

ENLT

(This command is entered directly through the Overlay Loader.)

- 6 Test the FDU:

LD 37

MSI 0

- If there is a problem, an IOD system message is generated.
- If there is no problem, exit LD 37:

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND16, NT8D69 Multi Disk Unit

Use this procedure to replace the multi disk unit (MDU).

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Enter the Equipment Data Dump program:
LD 43
- 2 Set the ENB/DIS switch to DIS on the faceplate of both QPC584 Mass Storage Interface (MSI) or NT9D34 Enhanced Mass Storage Interface (EMSI) cards.
- 3 Remove the floppy disks from their disk drives.
- 4 Tag and disconnect the cable(s) to the faceplate of the MDU.
- 5 Unhook the locking devices on the MDU and gently pull the unit forward two or three inches. Wait at least 10 seconds, then pull the unit out of the card cage.

CAUTION

You must wait *at least 10 seconds* before you remove the MDU from the card cage. This allows the hard disk to stop.

Installing equipment

- 1 Insert the replacement MDU into the vacated slot and hook the locking devices.
- 2 Connect the cable(s) to the faceplate of the MDU.
- 3 Install the floppy disks in the replacement MDU.
- 4 Set the ENB/DIS switch to ENB on both MSI or EMSI cards.
- 5 Restore data from the floppy disks to the hard disks. Enter:

RES

- 6 Test the MDU:

LD 37

MSI 0

- If there is a problem, an IOD system message is generated.
- If there is no problem, exit LD 37:

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

NTND31 ROM Card

This read-only memory (ROM) card is attached to the NTND01 Integrated CPU/Memory (ICM) Card. Use this procedure to replace an NTND31 ROM Card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the ICM card is removed.

Removing equipment

- 1 To replace the ROM card you must remove the ICM card. Unhook the locking devices on the ICM card; pull it out of the card cage.
- 2 Remove the ROM card from the ICM card:
 - On the top (component side) of the ICM card, remove the screw and washer at each corner of the ROM card.
 - Gently unplug the ROM card from the pin connector.

CAUTION

When you remove the ROM card, do not touch other components on the ICM card.

Installing equipment

- 1** Install the replacement ROM card on the ICM card:
 - Plug the replacement ROM card into the pin connector.
 - Install the screw and washer at each corner of the ROM card.
- 2** Reinsert the ICM card and hook the locking devices. The system will sysload at this point.
- 3** Tag defective equipment with a description of the problem and package it for return to a repair center.

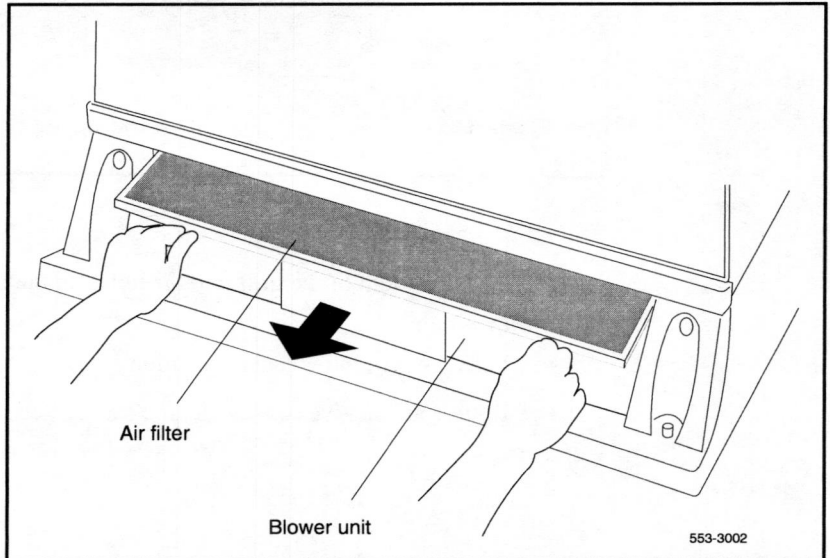
P0699798 Air Filter

Use this procedure to replace the air filter in the pedestal.

Note: You do not need to power down the system to perform this procedure.

- 1 Remove the pedestal front grill and set it aside. The air filter is directly above the blower unit in a slot in the pedestal (see Figure 36).

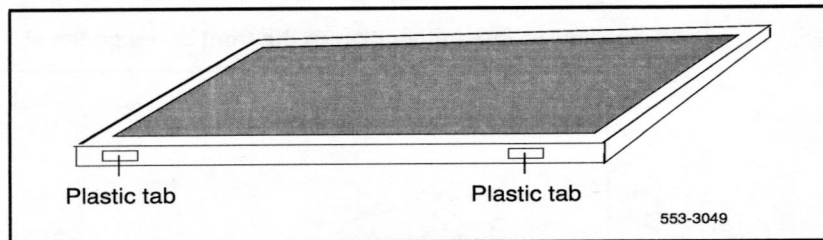
Figure 36
Blower unit and air filter in the front of the pedestal



- 2 Grasp the plastic tabs on the front of the air filter. Pull the filter out of the pedestal.

- 3 To install a clean, dry air filter:
 - Make sure the plastic tabs will be on the front of the filter (see Figure 37).
 - Gently push the filter into the pedestal slot until it seats fully in the back.

Figure 37
Pull-tab locations on the air filter



- 4 To reinstall the pedestal grill:
 - Fit the bottom of the grill into the holes on the bottom edge of the pedestal.
 - Push the grill into a locked position against the pedestal.
 - If there are captive screws on the grill, tighten the screws.

QMM42 Security Data Cartridge

Use this procedure to replace the data cartridge on the NT6D63 I/O Processor (IOP), QPC584 Mass Storage Interface (MSI), NT9D34 Enhanced Mass Storage Interface (EMSI), or QPC742 Floppy Disk Interface (FDI) Card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Disable the host (MSI, EMSI, FDI, or IOP) card.

- For an MSI, EMSI, or FDI card, the associated CPU must be inactive.

If you need to switch CPUs:

LD 35

SCPU

exit LD 35

Software disable the MSI, EMSI, or FDI card:

LD 37

DIS MSI 0

- For an IOP card, software disable the IOP card associated with the active CPU:

LD 137

DIS IOP

this also disables the associated CMDU or IOP/CMDU, or both CMDUs or IOP/CMDUs if they are in sync

- 2 Set the ENB/DIS switch to DIS on the host card.

For an MSI, EMSI, or FDI card, also disconnect the cable to the card.

- 3 Unhook the locking devices on the card; pull it out of the card cage.
- 4 Remove the screw that secures the data cartridge. Gently unplug the cartridge from the connectors on the component side of the host card.

Installing equipment

- 1 Plug the replacement data cartridge into the connectors on the component side of the host card. Install the screw that secures the cartridge.

CAUTION

To avoid system failure, the ID number on the data cartridge must match the ID number of the system.

- 2 Reinsert the card and hook the locking devices.
For an MSI, EMSI, or FDI card, reconnect the cable to the card.
- 3 Set the ENB/DIS switch to ENB.

4 Test the host card.

- For an MSI, EMSI, or FDI card:

LD 37**MSI 0**********

exit LD 37

- For an IOP card, test and enable the card:

LD 137**DIS IOP**

the card must be disabled for testing

TEST IOP**ENL IOP**this also enables the CMDU(s) or
IOP/CMDU(s)********

exit LD 137

If there is a problem, an IOD or CIOD system message is generated and the red LED lights on the faceplate of the card.

5 Tag defective equipment with a description of the problem and package it for return to a repair center.

Note: For dual-CPU systems, repeat this procedure for the second data cartridge.

QPC43 Peripheral Signaling Card

Use this procedure to replace a peripheral signaling card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Disabling or removing a peripheral signaling card from a network shelf disables all loops on that shelf.

Removing equipment

- 1 Check the status of the peripheral signaling card:

LD 32

STAT PER x Table 12 lists peripheral signaling card numbers specified by "x"

- If the response is **DSBL**, go to Step 2.
- If the response is **ENBL**, enter **DSPS x** to disable the card, then go to Step 2.

- 2 Set the ENB/DIS switch to DIS.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set the jumper plug on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable the card and loops serviced by the card:

ENPS x

- When the process is complete, you will receive a system response.
- If there is a problem, an NPR system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 32:

- 6 Test each loop serviced by the peripheral signaling card:

LD 30**LOOP loop** "loop" is a loop number (see Table 12)

exit LD 30

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

Table 12
Peripheral signaling card numbers

Group/ shelf	Peripheral signaling card	Loops disabled/enabled		
0 / 0	0	0	—	15
0 / 1	1	16	—	31
1 / 0	2	32	—	47
1 / 1	3	48	—	63
2 / 0	4	64	—	79
2 / 1	5	80	—	95
3 / 0	6	96	—	111
3 / 1	7	112	—	127
4 / 0	8	128	—	143
4 / 1	9	144	—	159

QPC215 Segmented Bus Extender Card

Use this procedure to replace a segmented bus extender (SBE) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Software disable the SBE (the QPC441 3-Port Extender Card will also be disabled):
 - The CPU associated with the SBE must be inactive. To switch CPUs:
LD 35
SCPU
 - Disable the SBE:
DIS EXT xxx Table 13 lists extender codes specified by “xxx”

Table 13
Extender codes

Extender number	From	To
0G0	CPU 0	Network Group 0
0G1	CPU 0	Network Group 1
0G2	CPU 0	Network Group 2
0G3	CPU 0	Network Group 3
0G4	CPU 0	Network Group 4
1G0	CPU 1	Network Group 0
1G1	CPU 1	Network Group 1
1G2	CPU 1	Network Group 2
1G3	CPU 1	Network Group 3
1G4	CPU 1	Network Group 4

- 2 Set the ENB/DIS switch to DIS.
- 3 Tag and disconnect cables to the card.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

CAUTION

Incorrect switch settings on the SBE can cause a system failure.

- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.
- 6 Software enable and test the SBE card:

ENL EXT xxx

TCPU

SCPU

- When the process is complete, you will receive a system response.
- If there is a problem, a CED system message is generated and the red LED lights on the faceplate of the appropriate card.
- If there is no problem, exit LD 35:

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC412 InterGroup Switch Card

Use this procedure to replace an intergroup switch (IGS) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

1 Software disable the IGS:

- The associated CPU must be inactive. If you need to switch CPUs:

LD 35

SCPU switch CPU

******** exit LD 35

- Disable the IGS:

LD 39

DISI IGS xx “xx” is the IGS card number—0 to 19

You will see **ISR043** on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

2 Set the ENB/DIS switch to DIS.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

3 Tag and disconnect cables to the card you are removing.

4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Connect cables to the replacement card.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable and test the IGS:

ENL IGS xx**STAT IGS**

- When the process is complete, you will receive a system response.
- If there is a problem, an ISR system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 39:

- 6 Test the IGS cards:

LD 45**NSIG**

- If there is a problem, a CED system message is generated.
- If there is no problem, exit LD 45:

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC441 Three-Port Extender Card

Use this procedure to replace a three-port extender (3PE) card. To software disable the 3PE card:

- In option 61, go directly to Step 2 on page 266.
- In option 71, you must disable the associated QPC215 Segmented Bus Extender (SBE) Card. Go to Step 1 on page 265.
- In options 51C, 61C, 81, and 81C, you must disable the associated NT6D65 Core to Network Interface (CNI) Card. Go to Step 1 on page 265.

Note 1: In any Network Module, before you hardware disable the 3PE card you must software disable the QPC43 Peripheral Signaling Card, the QPC412 Intergroup Switch (IGS) Card, and any serial data interface (SDI) cards in the card cage.

Note 2: In options 51C, 61C, 81, and 81C, if you are replacing the 3PE card in the Core/Network or Core Module, before you hardware disable the 3PE card you must software disable the QPC471 or QPC775 Clock Controller Card on the same CPU. Make sure the replacement card is QPC441 vintage F or later.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

Removing equipment

- 1 Software disable the 3PE. The CPU associated with the SBE or CNI card must be inactive:

- In option 71, if you need to switch CPUs:

LD 35

SCPU

Disable the SBE card:

DIS EXT xxx Table 14 lists extender codes specified by "xxx"
******** exit LD 35

Table 14
Extender codes

Extender number	From	To
0G0	CPU 0	Network Group 0
0G1	CPU 0	Network Group 1
0G2	CPU 0	Network Group 2
0G3	CPU 0	Network Group 3
0G4	CPU 0	Network Group 4
1G0	CPU 1	Network Group 0
1G1	CPU 1	Network Group 1
1G2	CPU 1	Network Group 2
1G3	CPU 1	Network Group 3
1G4	CPU 1	Network Group 4

- In options 51C, 61C, 81, and 81C, check the status of all configured CNI cards and the network group number of both ports on each CNI card:

STAT CNI

The CPU associated with the CNI card must become inactive. If you need to switch CPUs:

LD 135

SCPU

Disable the CNI port associated with the 3PE card:

DIS CNI c s p "c" is the CPU (0 or 1), "s" is the card slot (8-12), "p" is the port (0 or 1)

**** exit LD 135

In options 51C, 61C, 81, and 81C, if the 3PE card is in the Core or Core/Network Module, you must disable the clock controller card in that module. Check the status of the clock:

LD 60

SSCK x "x" is the CPU (0 or 1)

If the clock is active, switch the clock to make it inactive:

SWCK

Disable the clock:

DIS CC **x**

**** exit LD 60

Go to Step 5 on page 267.

- 2** Software disable the associated peripheral signaling card:

LD 32

DSPS x Table 15 lists peripheral signaling card numbers specified by “x”

**** exit LD 32

Table 15
Peripheral signaling card numbers

Group/ shelf	Peripheral signaling card	Loops disabled/enabled			
0 / 0	0	0	—	15	
0 / 1	1	16	—	31	
1 / 0	2	32	—	47	
1 / 1	3	48	—	63	
2 / 0	4	64	—	79	
2 / 1	5	80	—	95	
3 / 0	6	96	—	111	
3 / 1	7	112	—	127	
4 / 0	8	128	—	143	
4 / 1	9	144	—	159	

- 3 Software disable each port on any associated SDI cards:

LD 37

DIS TTY x "x" is the number of the interface device attached to a port

 exit LD 37

CAUTION

If the system terminal is assigned to an SDI port that will be disabled, assign it to another port before the SDI is disabled.

- 4 Software disable the associated IGS cards:

LD 39

DISI IGS x "x" is the IGS card number—0 to 19

 exit LD 39

You will see **ISR043** on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

- 5 Set the ENB/DIS switch on the 3PE to DIS.
 6 Tag and disconnect cables to the 3PE.
 7 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement 3PE card.
- 2 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.
- 6 Enable cards.

- In options 61 and 71:

LD 35

ENL EXT xxx Table 14 lists extender codes

**** exit LD 35

Press the Man Int button to initialize the system.

- In options 51C, 61C, 81, and 81C, enable and test the CNI and 3PE cards:

LD 135

ENL CNI c s p CPU (0 or 1). Slot (8–10), port (0 or 1) for option 81 and slot 12, port 0 for options 51C, 61C, and 81C.

**** exit LD 135

If the LED on the 3PE card turns off, go to Step 7. If the LED stays lit, press the Man Int button to initialize the system.

In options 51C, 61C, 81, and 81C, if the 3PE card is in the Core/Network or the Core Module, enable the clock controller card:

LD 60**ENL CC x********** exit LD 60

If there is a problem, a CED or CCED system message is generated and the red LED lights on the faceplate of the appropriate card.

- 7** Check to see that all cards were enabled.

Check the status of the IGS card:

LD 39**STAT IGS x** "x" is the IGS card number—0 to 19

If the card is still disabled, enable it:

ENL IGS xx******** exit LD 39

Check the status of SDI ports:

LD 37**STAT**

If any port still disabled, enable it:

ENL TTY x******** exit LD 37

Check the status of the peripheral signaling card:

LD 32**STAT PER x** Table 15 lists peripheral signaling card numbers

If the card is still disabled, enable it:

ENPS x******** exit LD 32

- 8** Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC471, QPC775 Clock Controller Card

Use this procedure to replace a clock controller (CC) card.

Note: The QPC775 Clock Controller is used in Canadian and International applications. QPC775 and QPC471 cards cannot be combined in one system.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 The clock controller card must be on the inactive CPU. If you need to switch the active CPU:

LD 35 (for other than options 51C, 61C, 81, and 81C) or **LD 135** (for options 51C, 61C, 81, and 81C)

SCPU

- 2 Disable the clock controller card:

- The card you are removing must be inactive:

LD 60

- In a single-CPU system:

Disable the clock controller card.

DIS CC x "x" is the card number—0 or 1

- In a dual-CPU system:

Check the status of the clock controller card you are removing.

SSCK x "x" is the card number—0 or 1

If the clock is active, switch clocks.

SWCK switch system clock from active to standby
Make sure the card you are removing is disabled and the other clock controller card is active and in free run mode.

SSCK x

TRCK FRUN

Disable the clock controller card you are removing.

DIS CC x "x" is the card number—0 or 1

- 3 Set the ENB/DIS switch to DIS on the card you are removing.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 4 Tag and disconnect cables to the card you are removing.
- 5 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches on the replacement card. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.
- 6 Software enable the card:

ENL CC x

Note: With a vintage H clock controller card, do not issue the tracking (TRCK) or status (SSCK) commands at this time. If you do issue these commands, the system may respond with an inaccurate error condition.

- In a single-CPU system, complete the replacement procedure by exiting LD 60:

- In a dual-CPU system proceed with the following steps.

7 Switch CPUs:

LD 35 (for other than options 51C, 61C, 81, and 81C) or **LD 135** (for options 51C, 61C, 81, and 81C)

SCPU

8 Activate the newly installed card and verify that it is active:

LD 60

SWCK

SSCK x

9 If applicable, issue a tracking command:

TRCK aaa “aaa” is PCK for track primary clock, SCLK for track secondary clock, or FRUN for free run mode

Note: Set the clock source to the status it was in before the replacement procedure.

10 Verify clock switch-over and tracking:

SWCK

SSCK x

exit LD 60

11 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC477 Bus Terminating Unit

Use this procedure to replace a bus terminating unit (BTU).

Note: Check the codes on all replacement BTUs.

- QPC477-A10 and QPC477-B10 BTUs are interchangeable in NT8D35 Network Modules.
- QPC477-B10 BTUs must be used in NT6D60 Core Modules.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

- 1 Turn off power to the module:
 - With AC power, set the circuit breaker on the Module Power Distribution Unit (MPDU) to OFF (down).
 - With DC power, set the switch on the power supply to OFF (down).
 - 2 Remove enough cards on both sides of the BTU to access the unit.

See *Circuit card installation and testing* (553-3001-211) for BTU slot locations.
 - 3 Gently pull the BTU out of the card cage.
 - 4 Insert the replacement BTU into the vacated slot.
 - 5 Reinstall the cards on both sides of the BTU.
 - 6 Turn on power to the module:
 - With AC power, set the MPDU circuit breaker to ON (up).
 - With DC power, set the power supply switch to ON (up).
- Note:** As necessary, software reenable cards in the module. See the appropriate replacement procedures in this document.
- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC513, QPC841 Serial Data Interface Card

Use this procedure to replace a serial data interface (SDI) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

If the system terminal is assigned to the SDI being replaced, assign it to another port before this SDI is disabled.

Removing equipment

- 1 Software disable each port on the SDI:

LD 37

DIS TTY x "x" is the number of the interface device attached to a port

- 2 Set the ENB/DIS switch to DIS.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1** Set the ENB/DIS switch to DIS on the replacement card.
- 2** Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3** Insert the replacement card into the vacated slot and hook the locking devices.
- 4** Connect cables to the replacement card.
- 5** Set the ENB/DIS switch to ENB on the replacement card.
- 6** Software enable each port on the card:

ENL TTY x

- When the process is complete, you will receive a system response.
- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

- 7** Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC579 CPU Function Card

Use this procedure to replace a CPU function (FN) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

Removing equipment

- 1 Disable the function card you are replacing by disabling the associated QPC580 CPU Interface (IF) Card. This CPU must be inactive.
 - If you need to switch CPUs:
LD 35
SCPU
 - Set the NORM/MAINT switch to MAINT on the *active* interface card. (This keeps the system from switching to the inactive CPU.)
 - Set the ENB/DIS switch to DIS on the *inactive* interface card.
- 2 Disconnect the cable between the function card and the interface card.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

- 4 Gently unplug the ROM Card from the connectors on the component side of the function card.

CAUTION

When you remove the ROM card, do not touch other components on the function card.

Installing equipment

- 1 Plug the ROM card into connectors on the component side on the replacement function card.
- 2 Insert the replacement function card into the vacated slot and hook the locking devices.
- 3 Connect the cable between the replacement function card and the interface card.
- 4 Enable the function card by enabling the interface card:
 - Set the ENB/DIS switch to ENB on the inactive interface card.
 - Set the NORM/MAINT switch to NORM on both interface cards.
- 5 Test and switch CPUs:

TCPU**SCPU**

- If there is a problem, a CED system message is generated.
- If there is no problem, exit LD 35:

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC580 CPU Interface Card

Use this procedure to replace a CPU interface (IF) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

Removing equipment

- 1 Disable the interface card. This CPU must be inactive.
 - If you need to switch CPUs:
LD 35
SCPU
 - Set the NORM/MAINT switch to MAINT on the *active* interface card. (This keeps the system from switching to the inactive CPU.)
 - Set the ENB/DIS switch to DIS on the *inactive* interface card (the one you are replacing).
- 2 Disconnect the cable between the interface card and the QPC579 CPU function card.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1** Set the ENB/DIS switch to DIS on the faceplate of the replacement card.
- 2** Insert the replacement card into the vacated slot and hook the locking devices.
- 3** Connect the cable between the interface card and the function card.
- 4** Enable the interface card:
 - Set the ENB/DIS switch to ENB on the replacement card.
 - Set the NORM/MAINT switch to NORM on both interface cards.
- 5** Test and switch CPUs:

TCPU**SCPU**

- If there is a problem, a CED system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 35:

- 6** Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC584 Mass Storage Interface Card

Use this procedure to replace a mass storage interface (MSI) card. See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Save the current data configuration to the disk drive unit:

LD 43

EDD execute datadump

**** exit LD 43

- 2 Disable the MSI card:

- The associated CPU must be inactive. If you need to switch CPUs:

LD 35

SCPU

- Software disable the MSI card:

LD 37

DIS MSI 0

- Set the ENB/DIS switch to DIS on the faceplate of the MSI card.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 3 Tag and disconnect the cable to the card you are removing. If the replacement card is an EMSI card, remove the NT8D80 cable from the connector on the MDU.
- 4 Unhook the locking devices on the card; pull it out of the card cage.
- 5 Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the MSI card.

Installing equipment

- 1 Plug the data cartridge into the connectors on the component side of the replacement MSI or EMSI card. Install the screw that secures the cartridge.
- 2 Set the ENB/DIS switch to DIS on the replacement card.
- 3 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

CAUTION

Incorrect switch settings on an MSI or EMSI card can cause a system failure.

- 4 Insert the replacement card into the vacated slot and hook the locking devices.
- 5 Connect the cable to the replacement card. If the replacement card is an EMSI card, install an NT9D89 cable between the connectors on the MDU and the EMSI card.
- 6 Set the ENB/DIS switch to ENB on the replacement card.
- 7 Switch to the active CPU:

LD 35

SCPU

- 8 Test the MSI card:

LD 37

MSI 0

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

- 9 Restore the current data configuration:

LD 43

RES

Note: If three system software disks are used, disks A1 and B1 must be installed in the disk drive units after the restore operation.

- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC659 Dual Loop Peripheral Buffer Card

Use this procedure to replace a dual loop peripheral buffer (DLB) card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Service is interrupted when a loop is disabled.

Removing equipment

- 1 Software disable the dual loop peripheral buffer:

LD 32

DISS l s "l s" are the loop and shelf numbers

- 2 Set the ENB/DIS switch to DIS.
- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.

- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.
- 6 Software enable the replacement card by enabling the shelf:

ENLS I s

- When the process is complete, you will receive a system response.
- If there is no problem, exit LD 32:

- 7 Test each shelf:

LD 30

SHLF I s

- If there is a problem, an NWS system message is generated and the appropriate red LED lights on the faceplate of the card.
- If there is no problem, exit LD 30:

- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC687 CPU Card

Use this procedure to replace the CPU card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the CPU card is removed.

Removing equipment

- 1 If the serial data interface (SDI) port is used, software disable it:

LD 37

DIS TTY x “x” is the number of the interface device attached to the port

- 2 Disconnect the cable to the SDI port.
- 3 Unhook the locking devices on the card; pull it out of the card cage.
- 4 Gently unplug the QPC940 ROM Card from the connectors on the component side of the CPU card.

CAUTION

When you remove the ROM card, do not touch other components on the CPU card.

Installing equipment

- 1 Plug the ROM card into the connectors on the component side on the replacement CPU card.
- 2 Set option switches and plugs on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.
- 3 Connect the cable to the SDI port.
- 4 Insert the replacement card into the vacated slot and hook the locking devices.

The system will sysload, or initialize, or both. Check system messages in the *X11 system messages guide*.

- 5 If the SDI port is used, software enable it:

LD 37
ENL TTY x
TTY x

The response should be:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789"#\$%*!&()<>-.:.,? READY FOR INPUT

Anything entered on the keyboard will be echoed until END is input.

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing the QPC723A Circuit Card

Use this procedure to replace a QPC723A card in a peripheral equipment (PE) module.

WARNING

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Record the on/off status of the LEDs on the faceplate.

- 2 Software disable the card:

LD 32

STAT l s c

DIS l s c

("l s c" represents loop, shelf number)

You will see "NPR011" on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

You will see the LED light up when the card becomes disabled.

- 3 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

- 1 Set option switches on the QPC723A replacement card the same as on the card you removed.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Depress the SELECT button on the faceplate so that the LEDs match the LEDs you recorded from the removed card.

- 4 Software enable the card:
LD 32
ENLC l s c
When the process is complete, you will receive a system response
STAT l s c
Obtain the status of the card to ensure that the card is enabled

To exit the program
- 5 (Optional): Test the card:
LD 30
SHLF l s
("l s" represents loop, shelf number)

Note: This command tests every card on the designated shelf.

If there is a problem, an NWS system message is generated and the red LED(s) on the faceplate of the card will remain lit.

If there is no problem, exit LD 30.
- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC742 Floppy Disk Interface Card

Use this procedure to replace a floppy disk interface (FDI) card. See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Save the current data configuration to the disk drive unit:

LD 43

EDD execute datadump
******** exit LD 43

- 2 Disable the FDI card:

- The associated CPU must be inactive. If you need to switch CPUs:

LD 35

SCPU

- Software disable the FDI card:

LD 37

DIS MSI 0

- Set the ENB/DIS switch to DIS on the faceplate of the FDI card.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 3 Tag and disconnect the cable to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.
- 5 Remove the screw that secures the QMM42 Data Cartridge. Gently unplug the cartridge from the connectors on the component side of the FDI card.

Installing equipment

- 1 Plug the data cartridge into the connectors on the component side of the replacement FDI card. Install the screw that secures the cartridge.
- 2 Set the ENB/DIS switch to DIS on the replacement card.
- 3 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit card installation and testing* (553-3001-211) for any differences.

CAUTION

Incorrect switch settings on an FDI card can cause a system failure.

- 4 Insert the replacement card into the vacated slot and hook the locking devices.
- 5 Connect the cable to the replacement card.
- 6 Set the ENB/DIS switch to ENB on the replacement card.
- 7 Switch to the active CPU:

LD 35

SCPU

8 Test the FDI card:**LD 37****MSI 0**

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

**********9** Restore the current data configuration:**LD 43****RES**********

Note: If three system software disks are used, disks A1 and B1 must be installed in the disk drive units after the restore operation.

10 Tag defective equipment with a description of the problem and package it for return to a repair center.

QPC940 ROM Card

This read-only memory (ROM) card is attached to the QPC687 CPU Card. Use this procedure to replace a QPC940 ROM Card.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

Call processing will stop when the CPU card is removed.

Removing equipment

- 1 To replace the ROM card you must remove the CPU card. Unhook the locking devices on the CPU card; pull it out of the card cage.
- 2 Gently unplug the ROM card from the connectors on the component side of the CPU card.

CAUTION

When you remove the ROM card, do not touch other components on the CPU card.

Installing equipment

- 1 Plug the replacement ROM card into the connectors on the component side of the CPU card.
- 2 Reinsert the CPU card and hook the locking devices. The system will sysload at this point.
- 3 Tag defective equipment with a description of the problem and package it for return to a repair center.

Replacing the Security Device on the NT5D61 IODU/C

Use this procedure to replace the Security Device on the NT5D61 Input/Output Disk Unit with CD-ROM (IODU/C) Card.

The Security Device is a field removable component and is located in the upper right corner of an IODU/C card. The device does not contain feature or software release specific information, but it has a unique custom program necessary for each customer. It is intended to serve the customer through numerous upgrade and feature changes.

The Security Device is replaced only if such a replacement is suggested by maintenance and/or diagnostic programs.

WARNING

Performing this procedure in a nonredundant system, such as a 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure the system will warm start, causing a momentary interruption in call processing.

Note: To replace the Security Device, a new Security Device and keycode are required. On redundant systems, the new keycode must validate against the new and existing Security Device.

Replacing the Security Device on a redundant system

The procedure begins with the validation of the new Keycode against the existing Security Device.

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the *inactive* Core Module or Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Note: If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 Use LD 135 to switch to the Core which contains the non-faulty Security Device.

LD 135 to load the program
SCPU switch CPUs (if necessary)
******** exit LD 135

- 3 Insert the keycode diskette into the floppy drive on the IODU/C with the non-faulty Security Device.
- 4 In LD 143, print the pending keycode contents. Use "KSHO F0" if your keycode is on the diskette in the floppy drive on Core 0, or "KSHO F1" if your keycode is on the diskette in the floppy drive on Core 1:

LD 143 to load the program
KSHO F0 print the contents of the candidate keycode
or
KSHO F1

- 5 Perform the KDIF command. Use "KDIF F0 REC" if the keycode diskette is inserted in the floppy drive on Core 0, or "KDIF F1 REC" if the keycode is inserted in the floppy drive on Core 1:

KDIF F0 REC to print the differences between the candidate and the current keycodes
or
KDIF F1 REC
******** to exit LD 143

- 6 Disable the inactive IODU/C:
- | | |
|-------------------|---|
| LD 137 | to load the program |
| STAT | to find the status of the IODU/Cs |
| DIS CMDU x | to disable the CMDU part of the inactive IODU/C x |
| DIS IOP x | to disable the IOP part of the inactive IODU/C x |

Perform the following steps on the *inactive* Core.

- 7 Set the ENB/DIS switch on the IODU/C with the faulty Security Device to DIS.
- 8 Unhook the locking devices and remove the IODU/C.
- 9 Remove the round 1/2" diameter IODU/C Security Device from the black round Security Device holder on the top right corner of the IODU/C card.
- 10 Locate the round 1/2" diameter IODU/C replacement Security Device.
- 11 Make sure the 8-digit code on the Keycode diskette matches the 8-digit code on the replacement Security Device.
- 12 With the Nortel side facing upward, slide the replacement Security Device between the security device holder and the holder clip. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 13 Reinsert the IODU/C into the following slots:
 - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17,18, and 19.
 - For NT9D11 Core/Network Modules and NT6D60 Core Modules, insert the IODU/C into slots 16, 17, and 18.
- 14 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.

15 Enable the IODU/C in LD 137:

STAT	to see the status of the IODU/Cs
ENL CMDU x	to enable the CMDU part of IODU/C x
ENL IOP x	to enable the IOP part of IODU/C x
STAT	to see the status of the IODU/Cs
****	to exit LD 137

16 Perform the KNEW command:

LD 143	to load the program
KNEW HD	to copy the keycode to the other Core
****	to exit the program

17 Reboot the system at a time that will minimize service impact.

The new keycode will not take effect until the system reboots.

Replacing the Security Device on an option 51C system

WARNING

Performing this procedure in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:
9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF
- 2 Set the ENB/DIS switch on the IODU/C with the faulty Security Device to DIS.
- 3 Unhook the locking devices and remove the IODU/C.
- 4 Remove the round 1/2" diameter Security Device from the black round Security Device holder on the top right corner of the IODU/C card.
- 5 Locate the round 1/2" diameter IODU/C replacement Security Device.
- 6 Make sure the 8-digit code on the Keycode diskette matches the 8-digit code on the replacement Security Device.
- 7 With the Nortel side facing upward, slide the replacement Security Device between the security device holder and the holder clip. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 8 Reinsert the IODU/C into the following slots:
 - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17, 18, and 19.
 - For NT9D11 Core/Network Modules and NT6D60 Core Modules, insert the IODU/C into slots 16, 17, and 18.

- 9 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.

- 10 Insert the Install diskette that corresponds to your CP card and press the MAN RST button on the CP card.
- 11 When the NT Logo Screen appears on the terminal, the Software Installation Tool has loaded. Press <CR> to go to the Install Menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (

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12 At the Main menu select **<u>** to go to the Install menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
=====

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> **<u>** - To Install menu.
<t> - To Tools menu.
<q> - Quit.

Enter choice **> u**

553-7780

13 Insert the new Keycode diskette when prompted and select **<a>** to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
=====

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> **<a>** - Continue with the keycode validation
(the keycode diskette is in the floppy drive).
<q> - Quit.

Enter Choice **> a**

553-7729

Following keycode validation, the system erases all keycode files from the hard disk and replaces them with the new keycode.

14 At the Install menu select <k> - "To install Keycode only."

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<o> - To copy System Software from the other Core.
<t> - To go to the Tools menu.
<k> - To install Keycode only.
<q> - Quit.

Enter choice > k

553-7793

15 Remove the diskette from the IODU/C.

16 Select **<q>** to quit and reload the system.

17 Select **<y>** to confirm quit.

Nortel Meridian - 1 Software/Database/PEROM CDRom INSTALL Tool (x11)
=====

You selected to Quit. Please confirm.

Please enter:

<CR>--> <y> - Yes, Quit.

<n> - No, DO NOT Quit.

Enter choice > **y**

553-7751

18 Select **<a>** to reboot the system.

Nortel Meridian - 1 Software/Database/PEROM CDRom INSTALL Tool (x11)
=====

You have selected to Quit the Software Installation Tool
You may reboot the system or return to the Main Menu.
Before rebooting the system, remove Install diskette from the floppy drive.

DO NOT REBOOT USING BUTTON!!

Please enter:

<a> - Reboot the system.

<CR>--> <m> - Return to the Main menu.

Enter Choice > **a**

553-7752

The Security Device replacement procedure is complete.

Replacing NT5D20 IOP/CMDU cards or NT6D63 IOP and NT6D64 CMDU cards with NT5D61 IODU/C cards

This procedure replaces NT5D20 IOP/CMDU cards or NT6D63 IOP and NT6D64 CMDU cards on options 51C/61C/81/81C with NT5D61 IODU/C cards. This procedure installs X11 release 23 software. Before performing this procedure you must be running X11 release 21 or later software. See *Software conversion procedures* (553-2001-320) for converting software to X11 release 21. The replacement procedure differs for a:

- redundant system
- single CPU system (procedure begins on page 328)

Note: IOP/CMDU or IOP and CMDU cards cannot be mixed with IODU/C cards in the same system.

WARNING

Performing this procedure in a nonredundant system, such as 51C, will disrupt system operation. If possible, schedule the replacement at the lowest traffic time.

See the *X11 input/output guide* for a description of all maintenance commands, and the *X11 system messages guide* for interpreting system messages.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

CAUTION

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.

Replacement procedures for redundant systems (options 61C, 81, 81C)

To perform this procedure the following is required:

- an Install Program diskette specific to your CP type
- a CD-ROM containing generic system software
- one Keycode diskette
- Database diskette(s)
- two NT5D61 IODU/C cards
- two IODU/C Security Devices
- a Database Transfer Utility diskette to archive the IOP/CMDU database on 2MB floppy diskettes.

Note: The diskettes in the Software Install Kit are write protected. Ensure that you unprotect the disks before installation.

Performing a data dump

Before starting this procedure, make a backup copy of the customer database on a 4MB diskette using the data dump routine:

- 1 Log into the system
- 2 Load the Equipment Data Dump Program (LD 43). At the prompt, enter
LD 43 to load the program
- 3 When "EDD000" appears on the terminal, enter
EDD to begin the data dump
- 4 When "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" appear on the terminal, enter
******** to exit the program

CAUTION

If the data dump is not successful, do not continue; contact your technical support organization. A data dump problem must be corrected before proceeding.

To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the *inactive* Core Module or Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

Splitting the cores

- 1 Verify that the disk drives are synchronized:

LD 137 to load the program

STAT to get the status of the disk drives

If the disks are synchronized, proceed with step 2. If they are not synchronized, execute the SYNC command:

SYNC to synchronize the drives

******** to exit the program

- 2 Verify that clock controller 0 is active. If it is not, switch to clock controller 0:

LD 60 to load the program

SSCK 0 to get the status of clock controller 0

SWCK to switch to clock controller 0 (if necessary)

******** to exit the program

- 3 Verify that Core 0 is the active Core:

LD 135 to load the program
STAT CPU to check CPU status
TEST CPU to test the CPU

If Core 0 is active, proceed with step 4. If Core 0 is not the active CPU, swap Cores and verify again:

SCPU to swap CPUs
STAT CPU to check CPU status

- 4 Verify that CMDU 0 is active. You may need to switch CMDUs.

LD 137 to load the program
STAT Get the status of CMDU and IOP.
SWAP Switch CMDUs (if necessary).

- 5 Set the MAINT/NORM switch on the CP card in Core 0 to MAINT.

- 6 Set the ENB/DIS switch on all CNI cards in Core 1 to DIS.

- 7 Insert the **Database Transfer Utility** diskette which corresponds to your Call Processor card into the IOP/CMDU or CMDU in Core 1.

- 8 Perform the following three steps in uninterrupted sequence:

- press and hold the MAN RST button on the CP card in Core 1
- set the MAINT/NORM switch on the CP card in Core 1 to MAINT
- release the MAN RST button

Transferring the database to 2MB

- 1 When the NT Logo Screen appears on the terminal, the Database Transfer Utility has loaded. Press <CR> to continue.

NT Meridian - 1 Software/Database/PEROM INSTALL Tool (x11)

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Please press <CR> when ready . . .

553-7790

CAUTION

When using the Database Transfer Utility, only select option <t> *Tools Menu* and <s> *To archive existing database*. Selecting any other option can result in operating system corruption.

- 2 At the Database Transfer Utility Install menu, select <t> to go to the Tools Menu.

NT Meridian - 1 Software/Database/PEROM INSTALL Tool (x11)

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

- <CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<t> - To go to the Tools menu.
<q> - Quit.

Enter choice > t

553-7791

- 3 At the Database Transfer Utility Tools menu select <s> to archive the database on one or more 2MB diskettes.

NT Meridian - 1 Software/Database/PEROM INSTALL Tool (x11)

TOOLS MENU

This is the Tools Menu for Install. You can select the tool that is appropriate. Please select one of the options below.

Please enter:

- <CR>--> <a> - To set the system date and time.
 - To partition the hard disk.
<c> - To display the partition size of hard disk.
<d> - To regenerate PDT Password.
<s> - To archive existing database.
<e> - To install CP software at a specified slot.
<m> - To go back to the Main Menu

Enter choice > s

553-7792

- 4 When the number of 2MB diskettes required is displayed, select <a>.

*** NT Meridian - 1 Database ARCHIVE Tool ***

The Total Size of the backup files: XXXX KBytes
Estimated number of 2MB floppy diskettes: X

- <CR>--> Please enter:
<a> - Continue.
<q> - Quit.

Enter choice >

553-7776

- 5 When prompted, insert the database diskette and select <a> to continue.

- 6 The message "Database backup complete!" will be displayed, and the Tools menu will reappear.
- 7 Remove the 2MB diskette from the IOP/CMDU, but *do not* reboot the system at this point.

Upgrading Core 1

- 1 **In systems equipped with an NT6D63 IOP and NT6D64 CMDU,** perform the following two steps to remove these cards:
 - To remove the IOP:
 - Set the ENB/DIS switch to DIS on the IOP being upgraded.
 - Remove the IOP.
 - To remove the CMDU:
 - If there is a floppy disk in the CMDU you are upgrading, remove the floppy disk.
 - Set the power switch on the front of the CMDU, if present, to OFF (down).
 - Wait at least 10 seconds, then unhook the locking devices on the CMDU and gently pull the unit out of the card cage.
- 2 **In system equipped with an NT5D20 IOP/CMDU,** perform the following two steps to remove this card:
 - Set the ENB/DIS switch on the IOP/CMDU to DIS.
 - Unhook the locking devices and remove the IOP/CMDU.
- 3 Locate the round 1/2" diameter IODU/C Security Device.
- 4 Make sure the 8-digit code on the keycode diskette matches the 8-digit code on the Security Device.
- 5 With the Nortel side facing upward, slide the Security Device between the black round security device holder on the top right hand corner of the IODU/C card and the holder clip. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.

Note: The next step installs the NT5D61AA vintage IODU/C card in Core 1. The AA vintage card has a CD-ROM drive which is required for software installation on Core 1.

- 6 Ensure that the ENB/DIS switch on the NT5D61AA IODU/C you will install is set to DIS.
- 7 Insert the NT5D61AA IODU/C into the following slots:
 - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17,18, and 19.
 - For NT9D11 Core/Network Modules and NT6D60 Core Modules, insert the IODU/C into slots 16, 17, and 18.
- 8 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.

- 9 Insert the Install diskette that corresponds to your CP type (68030, 68040, 68060) into the IODU/C on Core 1.
- 10 Install the CD-ROM disk into the CD-ROM drive. To install the CD-ROM:
 - press the button on the CD-ROM drive to open the CD-ROM disk holder
 - place the CD-ROM disk into the holder with the disk label showing
 - use the tabs to secure the CD-ROM in the disk holder
 - press the button again to close the CD-ROM disk holder (don't push the holder in by hand)
- 11 Press the MAN RST button on the CP card.
- 12 When the NT Logo screen appears, press <CR> to continue.
- 13 Enter the date and time.

14 When the Main Menu appears, select <u> to go to the Install menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <u> - To Install menu.

<t> - To Tools menu.

<q> - Quit.

Enter choice > u

553-7780

15 Insert the Keycode diskette when prompted and select <a> to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> <a> - Continue with the keycode validation
(the keycode diskette is in the floppy drive).

<q> - Quit.

Enter Choice > a

553-7729

Once the keycode is validated against the Security Device, the Install menu is displayed.

- 16** At the Install menu, select **** to install software, database, CP-BOOTROM, and IOP-ROM.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

- <CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<o> - To copy System Software from the other Core.
<t> - To go to the Tools menu.
<k> - To install Keycode only.
For Feature Expansion, use OVL143.
<q> - Quit.

553-7783

Enter choice > **b**

The Install Tool displays the software release to be installed and prompts you to confirm that the CD-ROM containing the software has been inserted.

17 Select **<a>** to continue with the software upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Install Utility will install x1123xx software for s/w for software generic xxxx
(Call Processor, System Type) on your system.
Please insert the installation CDROM into the drive on Core 1.

The labeled side of the CDROM should be side up in the CDROM tray.

Please enter:

<CR>--> <a> - CDROM is now in drive.

Continue with installation.

<q> - Quit.

Enter Choice > **a**

553-7732

- 18 A Status Summary is displayed indicating what will be installed. Select <y> to confirm the start of installation.

INSTALLATION STATUS SUMMARY

Option	Choice	Status	Comment
SW: CD to disk	yes		from xxxx to xxxx
SW: disk to ROM	yes		
Database	yes		
CP-BOOTROM	yes		
IOP-ROM	yes		

Please enter:

<CR> -> <y> - Yes, start Installation.

<n> - No, stop Installation. Return to the Main Menu.

Enter Choice> y

553-7731

The terminal displays information about the software upgrade.

19 Select **<a>** to continue with software installation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You selected to upgrade the system from release: xxxx to release: xxxx.

This will erase all old system files.

Database files will NOT be erased. You may continue installing the software or quit now and leave your system unchanged.

Please enter:

<CR>--> <a> - Continue with Upgrade.

<q> - Quit.

Enter Choice > a

553-7733

20 Select **<a>** to continue with the ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You have chosen to Upgrade CP-software in card slot xx from the context: x11xxxx to the context: x11xxxx.

This will replace old CP-software with the ROM image files:
"/p/os/flashos,/p/sl1/sl1res,/p/sl1/ovlres,/p/os/flashfs".

You may Continue with ROM upgrade or Quit now and leave ROM unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter Choice > a

553-7734

- 21 At the Database Menu, insert the first 2MB Database diskette in the IODU/C.
- 22 Select <a> to install the customer database.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You will now perform the database installation.

Note: If you are installing the Database from a floppy disk,
please insert the correct disk now.

Please enter:

<CR>--> <a> - Install CUSTOMER Database
(the customer database diskette must be in the Core 1 disk drive).
 - Install DEFAULT Database
(the installation CDROM must be in the Core 1 disk drive).
<d> - Copy Database from the redundant disk.
<e> - Check the Database that exists on the hard disk.
<q> - Quit.

Enter Choice > a

553-7779

- 23 Select <y> to start installation.
- 24 Select <a> to continue the database installation.
- 25 Select <a> to confirm that the database disk is in the drive.
- 26 Select <y> to load the database.

If the database does not fit on one diskette, you will be prompted to insert additional diskettes.
- 27 Press <CR> to delete the hardware infrastructure database files from the hard disk.

28 Select **<a>** to continue with the ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Please insert the DATABASE disk into the floppy drive.

Please enter:

<a> - DATABASE disk is now in the floppy drive.

<q> - Quit.

Enter Choice:

29 Select **<y>** to continue with the ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade CP-BOOTROM in card slot xx from the context: xxxxx to the context: xxxxx.

This will replace old CP-BOOTROM with the ROM image files:
"/p/os/cprom".

You may Continue with ROM upgrade or Quit now and leave ROM unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter Choice > a

553-7738

30 Select <y> to begin installation of IOP-ROM upgrade.

31 Select <a> to continue with the IOP-ROM upgrade

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade IOP-ROM in card slot xx from
the context: x11xxxx to the context: x11xxxx.

This will replace old IOP-ROM with the ROM image files:
"/p/os/ioprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter choice > a

553-7787

32 When the Status Summary screen appears, press <CR>.

33 When the Install Menu appears, select <q> to quit the Software Install
Tool.

34 Select <y> to confirm quit

35 **Remove the diskette** from the floppy drive.

36 Select <a> to reboot the system.

The system will reboot. Wait for the "INI" and "DONE" messages to
display before continuing. It will take at least 70 seconds between the
"DONE" and "INI" messages.

Switch call processing from Core 0 to Core 1**CAUTION****Call processing will be interrupted**

Perform the next steps carefully. This is the point at which your service is interrupted. Calls in progress will be interrupted, especially if Peripheral Software Download takes place.

Perform the next 4 steps in succession. Call processing will be switched from Core 0 to Core 1.

- 1** In Core 0, set the DIS/ENB faceplate switch on the IOP or IOP/CMDU card to DIS.
- 2** In Core 0, disable the NT6D65 CNI cards by setting the ENB/DIS faceplate switches to DIS.
- 3** In Core 1, enable the NT6D65 CNI cards by setting the ENB/DIS faceplate to ENB.
- 4** In Core 1, press the MAN INT button.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

- 5** Following a successful dial tone test, perform the following basic sanity tests:
 - Make sure calls can be placed
 - Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

Upgrading Core 0

- 1 Move the terminal cable to the J25 port on the I/O panel of the other Core or Core/Network Module, and continue with the following steps for the replacement of the second IOP/CMDU card.
- 2 **In systems equipped with an NT6D63 IOP and NT6D64 CMDU,** perform the following two steps to remove these cards:
 - To remove the IOP:
 - Set the ENB/DIS switch to DIS on the IOP being upgraded.
 - Remove the IOP.
 - To remove the CMDU:
 - If there is a floppy disk in the CMDU you are upgrading, remove the floppy disk.
 - Set the power switch on the front of the CMDU, if present, to OFF (down).
 - Wait at least 10 seconds, then unhook the locking devices on the CMDU and gently pull the unit out of the card cage.
 - Continue with step 4.
- 3 **In system equipped with an NT5D20 IOP/CMDU,** perform the following steps to remove this card:
 - Set the ENB/DIS switch on the IOP/CMDU to DIS.
 - Unhook the locking devices and remove the IOP/CMDU.
 - Continue with step 4.
- 4 Locate the round 1/2" diameter IODU/C Security Device.
- 5 Make sure that the 8-digit code on the Keycode diskette matches the 8-digit code on the Security Device.
- 6 With the Nortel side facing upward, slide the Security Device between the black round security device holder on the top right hand corner of the IODU/C card and the holder clip. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.

- 7 Ensure that the ENB/DIS switch on the IODU/C you will install is set to DIS.
- 8 Insert the IODU/C into the following slots:
 - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17,18, and 19.
 - For NT9D11 Core/Network Modules and NT6D60 Core Modules, insert the IODU/C into slots 16, 17, and 18.
- 9 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.
- 10 Insert the Install diskette that corresponds to your CP type into the IODU/C on Core 0.
- 11 Press the MAN RST button on the CP card.
- 12 When the NT Logo screen appears, press <CR> to continue.
- 13 Enter the date and time.
- 14 When the Main Menu appears, select <u> to go to the Install Menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <u> - To Install menu.
<t> - To Tools menu.
<q> - Quit.

Enter choice > u

553-7780

- 15 Insert the Keycode diskette when prompted and select <a> to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> <a> - Continue with the keycode validation
(the keycode diskette is in the floppy drive).
<q> - Quit.

Enter Choice > a

553-7729

Once the keycode is validated against the Security Device, the Install menu is displayed.

- 16** At the Install menu, select **<o>** to copy the software from Core 1 to Core 0.

=====

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

- <CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<o> - To copy System Software from the other Core.
<t> - To go to the Tools menu.
<k> - To install Keycode only.
For Feature Expansion, use OVL143.
<q> - Quit.

553-7784

Enter choice > **o**

- 17 Select <a> to copy /p partition from Core 1 to Core 0.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You selected to copy the hard disk /p partition from IODU on Core 1 to IODU on Core 0.

60 MB of disk will be copied.

This will erase old system files, Database files will NOT be erased.

Note that ERASED FILES CANNOT BE RECOVERED.

NOTE: Copy progress will be indicated by ... , one '.' per MB.

You may Continue with the copy operation or Quit now and leave your system unchanged.

Please enter:

<CR>--> <a> -Copy /p partition from one Core 1 to Core 0.

<q> - Quit.

Enter Choice > a

553-7739

- 18 Select <a> to continue with the upgrade.
- 19 When the software is installed successfully, press <CR> to install CP-software from the hard disk to Flash EEPROM, and install CP-BOOT ROM.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Release: xxxx was installed successfully into /p partition on your side

NOTE: In order to complete the install you must install flash ROM
In order to complete the install you must install CP BOOT ROM

Please press <CR> when ready...

553-7741

- 20 Select <a> to continue with ROM upgrade.
- 21 Select <a> to continue with ROM upgrade.
- 22 When the Status Summary appears, press <CR> to continue.
- 23 When the Install Menu appears, select <f> to install IOP-ROM.
- 24 Select <a> to continue with the IOP-ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDRom INSTALL Tool (x11)

You have chosen to Upgrade IOP-ROM in card slot xx from
the context: x11xxxx to the context: x11xxxx.

This will replace old IOP-ROM with the ROM image files:
"/p/os/ioprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.
<q> - Quit.

Enter choice > a

553-7787

- 25 When the Status Summary appears, press <CR> to continue.
- 26 When the Install Menu appears, select <d> to install the database.
- 27 Select <d> to copy the database from the redundant disk.
- 28 Select <y> to continue installation.
- 29 Select <a> to continue database copy.
- 30 When the Install Menu appears, select <q> to quit the system.
- 31 Select <y> to confirm quit
- 32 **Remove the diskette** from the floppy drive.

- 33 Select <a> to reboot the system.

The system will reboot. Wait for the "INI" and "DONE" messages to display before continuing. It will take at least 70 seconds between the "DONE" and "INI" messages.

Return the system to redundant mode

To place the system back in the redundant (normal) mode with automatic switchover capability, perform the following steps in uninterrupted sequence on the *inactive* Core:

- Press and release the MAN RST button on the CP card in the inactive Core. When SYS700 messages appear on the inactive CP LCD display, set the inactive CP NORM/MAINT switch to NORM.
- An HWI534 message on the active Core will be displayed indicating that memory synchronization has begun. An HWI533 message on the active Core indicates that memory synchronization is complete.
- In the inactive Core, enable the NT6D65 CNI cards by setting the ENB/DIS faceplate switches to ENB.
- Place the active CP NORM/MAINT faceplate switch to NORM.

Completing the upgrade

- 1 Perform a redundancy sanity test using the following sequence:

LD 135

STAT CNI	Get status of CNI cards.
STAT CPU	Get status of CPU and memories.
TEST CNI core slot	Test each inactive CNI card.

Note: Testing the CP and CNI cards and synchronizing memory takes up to 20 minutes for each test. When the CP test is complete, the memories are automatically synchronized.

- 2 Switch Cores, and test the other side.

TEST CPU	Test the standby (inactive) Core.
SCPU	Switch Cores.
TEST CNI core slot	Test each inactive CNI card.

Note: Testing the CP cards can take up to 20 minutes for each test. When the test is complete, the memories are automatically synchronized.

- 3 Clear the display, and minor alarms on both Cores.
CDSP Clear the displays on the Cores.
CMAJ Clear major alarm.
CMIN ALL Clear minor alarm.
- 4 Get the status of the Cores, CNIs, and memories
STAT CPU Get the status of both Cores.
STAT CNI Get the status of all configured CNIs and memories.
- 5 Load LD 137 and synchronize hard disks. Synchronization may take up to 50 minutes. To be sure that the contents of IODU/C 1 are copied to IODU/C 0, verify that IODU/C 0 is disabled.
LD 137
STAT Get the status of both IODU/Cs and redundancy.
SYNC Enter "Yes" to synchronize disks.
Wait until the memory synchronization successfully completes before continuing.
- 6 Get the status of the IODU/Cs and be sure IODU/C 0 is active. Switch if necessary.
LD 137
STAT Get the status of the IODU/Cs.
SWAP Switch IODU/C (if necessary).
STAT CMDU Get the status of the IODU/Cs. Be sure the same IODU/C and CPU are active.

- 7 Insert the database diskette into both IODU/Cs for backup. Load LD 43 and datadump. This creates a backup on the floppy disk in the active IODU/C.

LD 43

EDD

Data dump complete (or database backup complete) is printed when the data dump has been successfully completed. Investigate any EDD messages. Refer to *X11 input/output guide*.

- 8 Evaluate the number of call registers and telephone buffers that are configured for the system. Refer to *Meridian 1 capacity engineering* (553-3001-149).

The card replacement procedure is complete.

Replacement procedure for option 51C systems

To perform this procedure, the following is required:

- an Install diskette specific to your CP type
- a CD-ROM containing system software
- Keycode diskette
- Database diskette(s)
- one NT5D61AA IODU/C card
- one IODU/C Security Device
- a Database Transfer Utility to archive the IOP/CMDU or CMDU database on 2MB floppy diskettes.

Performing a data dump

Before starting this procedure, make a backup copy of the customer database on a 4MB diskette using the data dump routine:

- 1 Log into the system
- 2 Load the Equipment Data Dump Program (LD 43). At the prompt, enter
LD 43 to load the program

- 3 When "EDD000" appears on the terminal, enter
EDD to begin the data dump
- 4 When "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" appear on the terminal, enter
******** to exit the program

CAUTION

If the data dump is not successful, do not continue; contact your technical support organization. A data dump problem must be corrected before proceeding.

To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:

9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF

Upgrading the IOP/CMDU or IOP and CMDU to an IODU/C

- 1 Insert the **Database Transfer Utility** diskette which corresponds to your source (existing) Call Processor card into the IOP/CMDU or CMDU.
- 2 Press the MAN RST button on the CP card.

- 3 When the NT Logo Screen appears on the terminal, the Database Transfer Utility has loaded. Press <CR> to continue.

NT Meridian - 1 Software/Database/PEROM INSTALL Tool (x11)

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```

Northern Telecom — Meridian 1
Install Tool (x11)

Copyright 1992 - 1995 Northern Telecom, Inc.

Please press <CR> when ready . . .

553-7790

CAUTION

When using the Database Transfer Utility, only select options <t> *Tools Menu* and <s> *To archive existing database*. Selecting any other options can result in operating system corruption.

- 4 At the Database Transfer Utility Install menu, select <t> to go to the Tools Menu.

NT Meridian - 1 Software/Database/PEROM INSTALL Tool (x11)

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

- <CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<t> - To go to the Tools menu.
<q> - Quit.

Enter choice > t

553-7791

- 5 At the Database Transfer Utility Tools menu select **<s>** to archive the database on one or more 2MB diskettes.

NT Meridian - 1 Software/Database/PEROM INSTALL Tool (x11)

TOOLS MENU

This is the Tools Menu for Install. You can select the tool that is appropriate. Please select one of the options below.

Please enter:

- <CR>--> <a> - To set the system date and time.
 - To partition the hard disk.
<c> - To display the partition size of hard disk.
<d> - To regenerate PDT Password.
<s> - To archive existing database.
<e> - To install CP software at a specified slot.
<m> - To go back to the Main Menu

Enter choice > s

553-7792

- 6 When the number of 2MB diskettes required is displayed, select **<a>**.

*** NT Meridian - 1 Database ARCHIVE Tool ***

The Total Size of the backup files: XXXX KBytes
Estimated number of 2MB floppy diskettes: X

- <CR>--> Please enter:
<a> - Continue.
<q> - Quit.

Enter choice >

553-7776

- 7 Insert the first database diskette and select **<a>** to continue.

- 8 The message "Database backup complete!" will be displayed, and the Tools menu will reappear.
- 9 Remove the 2MB diskette from the IOP/CMDU, but *do not* reboot the system at this point.
- 10 Set the ENB/DIS switch on the IOP/CMDU to DIS.
- 11 Unhook the locking devices and remove the IOP/CMDU.
- 12 Locate the round 1/2" diameter IODU/C replacement Security Device.
- 13 Make sure the 8-digit code on the Keycode diskette matches the 8-digit code on the Security Device.
- 14 With the Nortel side facing upward, slide the Security Device between the black round security device holder on the top right hand corner of the IODU/C card and the holder clip. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 15 Ensure that the ENB/DIS switch on the IODU/C you will install is set to DIS.
- 16 Insert the IODU/C into slots 17, 18, and 19 in the NT9D11 Core/Network Module or NT5D21 Core/Net Module.
- 17 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.
- 18 Insert the Install diskette that corresponds to your CP-type into the IODU/C.

- 19 Install the CD-ROM disk into the CD-ROM drive. To install the CD-ROM:
 - press the button on the CD-ROM drive to open the CD-ROM disk holder
 - place the CD-ROM disk into the holder with the disk label showing
 - use the four tabs to secure the CD-ROM in the disk holder
 - press the button again to close the CD-ROM disk holder (don't push the holder in by hand)
- 20 Press the MAN RST button on the CP card.
- 21 At the Main menu select <u> to go to the Install menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

MAIN MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <u> - To Install menu.

<t> - To Tools menu.

<q> - Quit.

Enter choice > u

553-7780

- 22** Insert the Keycode diskette when prompted and select <a> to continue with the keycode validation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Please insert the diskette with the keycode file into the floppy drive.

Please enter:

<CR>--> <a> - Continue with the keycode validation
(the keycode diskette is in the floppy drive).
<q> - Quit.

Enter Choice > a

553-7729

Once the keycode is validated against the Security Device, the Install menu is displayed.

- 23** At the Install menu, select **** to install software, database, CP-BOOTROM, and IOP-ROM.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.
 - To install Software, Database, CP-BOOTROM, IOP-ROM.
<c> - To install Software only.
<d> - To install Database only.
<e> - To install CP-BOOTROM only.
<f> - To install IOP-ROM only.
<g> - To reinstall CP-Software.
<o> - To copy System Software from the other Core.
<t> - To go to the Tools menu.
<k> - To install Keycode only.
For Feature Expansion, use OVL143.
<q> - Quit.

553-7783

Enter choice > **b**

The Install Tool displays the software release to be installed and prompts you to confirm that the CD-ROM containing the software has been inserted.

24 Select **<a>** to continue with the software upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

Install Utility will install x1123xx software for s/w for software generic xxxx
(Call Processor, System Type) on your system.
Please insert the installation CDROM into the drive on Core 1.

The labeled side of the CDROM should be side up in the CDROM tray.

Please enter:

<CR>--> <a> - CDROM is now in drive.

Continue with installation.

<q> - Quit.

Enter Choice > **a**

553-7732

- 25 A Status Summary is displayed indicating what will be installed. Select <y> to confirm the start of installation.

INSTALLATION STATUS SUMMARY

Option	Choice	Status	Comment
SW: CD to disk	yes		from xxxx to xxxx
SW: disk to ROM	yes		
Database	yes		
CP-BOOTROM	yes		
IOP-ROM	yes		

Please enter:

<CR> -> <y> - Yes, start Installation.

<n> - No, stop Installation. Return to the Main Menu.

Enter Choice> **y**

553-7731

The terminal displays information about the software upgrade.

26 Select <a> to continue with software installation.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You selected to upgrade the system from release: xxxx to release: xxxx.

This will erase all old system files.

Database files will NOT be erased. You may continue installing the software or quit now and leave your system unchanged.

Please enter:

<CR>--> <a> - Continue with Upgrade.

<q> - Quit.

Enter Choice > a

553-7733

27 Select <a> to continue with the ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You have chosen to Upgrade CP-software in card slot xx from the context: x11xxxx to the context: x11xxxx.

This will replace old CP-software with the ROM image files:
"/p/os/flashos,/p/sl1/sl1res,/p/sl1/ovlres,/p/os/flashfs".

You may Continue with ROM upgrade or Quit now and leave ROM unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter Choice > a

553-7734

28 At the Database Menu, insert the first 2MB Database diskette in the IODU/C.

29 Select <a> to install the customer database.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You will now perform the database installation.

Note: If you are installing the Database from a floppy disk,
please insert the correct disk now.

Please enter:

<CR>--> <a> - Install CUSTOMER Database

(the customer database diskette must be in the Core 1 disk drive).

 - Install DEFAULT Database

(the installation CDROM must be in the Core 1 disk drive).

<d> - Copy Database from the redundant disk.

<e> - Check the Database that exists on the hard disk.

<q> - Quit.

Enter Choice > a

553-7779

30 Make sure the Database disk is inserted and select <a>:

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

Please insert the DATABASE disk into the floppy drive.

Please enter:

<a> - DATABASE disk is now in the floppy drive.

<q> - Quit.

Enter Choice> a

553-8057

31 Select <a> to continue with the CP-BOOTROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade CP-BOOTROM in card slot xx from
the context: xxxxx to the context: xxxxx.

This will replace old CP-BOOTROM with the ROM image files:
"/p/os/cprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter Choice > **a**

553-7738

32 Select <y> to begin installation of IOP-ROM upgrade.

33 Select <a> to continue with the IOP-ROM upgrade

Nortel Meridian - 1 Software/Database/PEROM CDRom INSTALL Tool (x11)

You have chosen to Upgrade IOP-ROM in card slot xx from
the context: x11xxxx to the context: x11xxxx.

This will replace old IOP-ROM with the ROM image files:
"/p/os/ioprom".

You may Continue with ROM upgrade or Quit now and leave ROM
unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter choice > a

553-7787

34 Select <q> to quit and reload the system.

35 Select <y> to confirm quit.

36 **Remove the diskette** from the floppy drive.

37 Select <a> to reboot the system.

The system will automatically perform a sysload and system
initialization during which several messages will appear on the system
terminal. Wait until initialization has finished (INI messages are no
longer displayed on the system terminal) before continuing.

38 Verify that the "DONE" message appears on the system terminal.

Note: The SYSTEM INI message may take 70 seconds or more to
appear.

Completing the upgrade

- 1 Log into the system.
- 2 Verify CPU and CNI functionality:

LD 135	to load the program
STAT CPU	to check the CPU status
STAT CNI	to verify CNI functionality
****	to exit the program

Make a backup of the customer database on 2MB diskettes:

- 3 Load the Equipment Data Dump Program (LD 43). At the prompt, enter
LD 43 to load the program
- 4 When "EDD000" appears on the terminal, enter
EDD to begin the data dump
- 5 When "DATADUMP COMPLETE" and "DATABASE BACKUP COMPLETE" appear on the terminal, enter
******** to exit the program

CAUTION

If the data dump is not successful, do not continue; contact your technical support organization. A data dump problem must be corrected before proceeding.

- 6 Evaluate the number of call registers and telephone buffers that are configured for the system. Refer to *Meridian 1 capacity engineering* (553-3001-149).

The card replacement procedure is complete.

Replacing an NT7D10 PDU with an NT7D67CB PDU

Use this procedure to replace an NT7D10 PDU with an NT7D67CB PDU in DC-powered systems.

Note 1: The NT7D67CB PDU replaces the NT7D10 PDU. However, both PDUs can be used in a system.

Note 2: Conduit is not required with the NT7D67CB PDU but can be used.

Before you begin this procedure, prepare for the installation:

- Additional wire may be required (see Step 1).
- An electric drill, fitted with a .234-in. metal bit must be available.
- A Rear Mount Conduit Kit (NT7D0902) must be available.

WARNING

Module covers are *not* hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

- 1 Check the length of existing wire to the PDU. Due to the location of the field wiring terminal block on the NT7D67CB PDU, 6 to 9 inches more length is required to reach its terminals than is required to reach those on the NT7D10 PDU.

Note 1: The existing service loop where wire enters the pedestal may have enough excess length or enough slack wire may exist in the conduit path from the power plant to allow pulling a sufficient amount through to the pedestal. Figure 42, located further on in this procedure, shows the location on the NT7D67CB PDU to which wiring must extend. If existing wiring will not reach, replace the entire wire run from the power plant. Do *not* splice short pieces of wire onto the end of existing wiring.

Note 2: If a QCAD321 or an NT6D53 junction box is installed on the power feed to the console, the wiring from the power plant may have to be altered as follows:

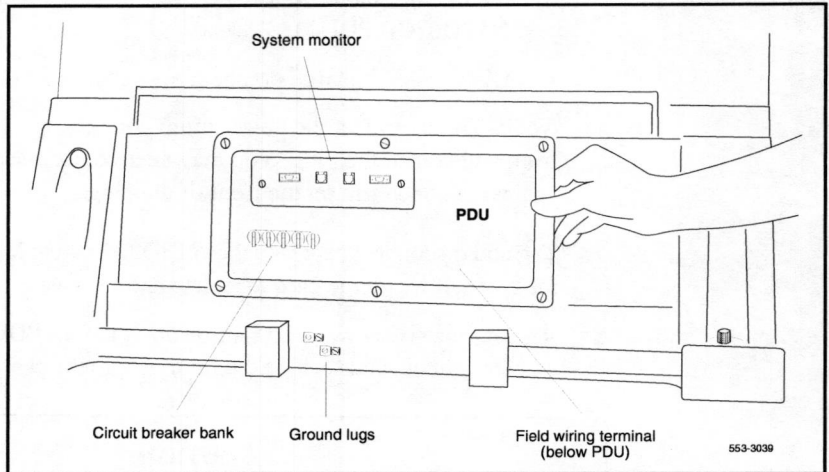
- If five #4 AWG wires are run from the power plant to the junction box (two BAT, two RTN, and one LRTN), then the junction box must *not* be used. The junction box must be removed and the entire wire run from the power plant to the pedestal must be replaced. Do *not* splice short pieces of wire onto the end of existing wiring.
 - If nine #4 AWG wires are run from the power plant to the junction box (four BAT, four RTN, and one LRTN), then the junction box can be used. However, the #10 AWG wires from the junction box to the pedestal may have to be replaced to provide sufficient length. Do *not* splice short pieces of wire onto the end of existing wiring.
- 2 Disconnect DC power at the source (not at the PDU).

CAUTION

Before performing these procedures, disconnect the power at the source; simply turning off the circuit breakers does not shut off power to the system monitor.

- 3 Remove the grill on the rear of the pedestal.
- 4 Set all five circuit breakers on the PDU to OFF (down). Figure 38 shows the NT7D10 PDU in the rear of the pedestal.

Figure 38
NT7D10 Power Distribution Unit DC



- 5 Unseat the blower unit in the front of the pedestal:
 - Remove the grill on the front of the pedestal. Set the toggle switch on the front of the unit to OFF (left).
 - Turn the screws on the front of the unit counterclockwise and pull the unit out several inches so the connector on the rear disengages.

WARNING

The unit is heavy and the blades on the blower may still be rotating up to 2 minutes after the power is turned off.

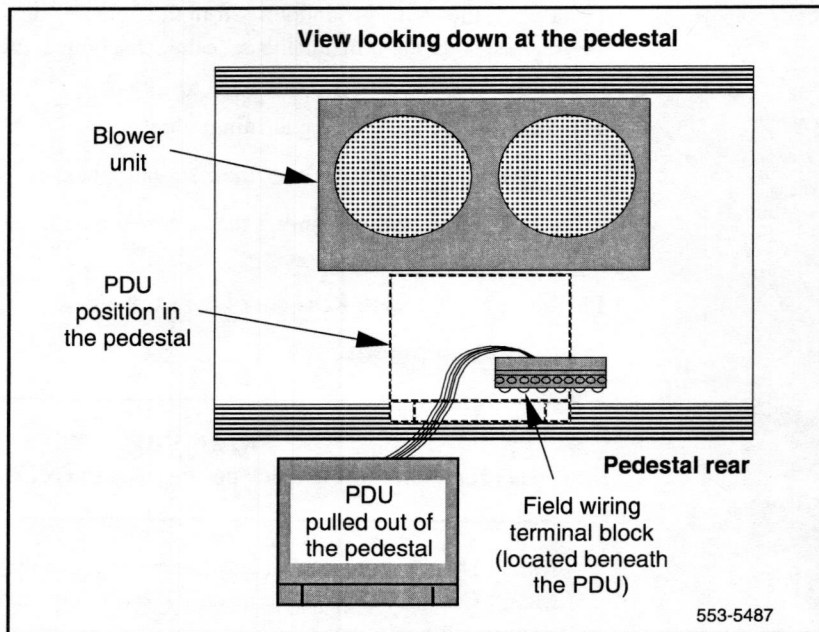
- 6 Disconnect cables to the module above the pedestal (module 0):
 - Remove the rear cover on the module.
 - Remove the I/O safety panel over the backplane in the module.
 - Disconnect the system monitor ribbon cable from the PDU and from the module and set it aside for reconnection with the replacement NT7D67CB PDU.
 - Disconnect the large orange power connector (J1) from the PDU.

Note: To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.
- 7 Tag and disconnect cables to the NT8D22 System Monitor card. Loosen the two screws on the card faceplate and remove it.
- 8 Remove the six screws that position the NT7D10 PDU. Carefully pull the unit straight out and set it on the floor next to the pedestal (see Figure 39).

CAUTION

The PDU cannot be completely removed from the pedestal until wires to the field wiring terminal block are disconnected. Label wires carefully. Improper wiring can cause system damage.

Figure 39
Cabling between the PDU and the field wiring terminal block



- 9 Tag and then disconnect all wiring to the field wiring terminal block.
- 10 Locate the frame ground wire from the field wiring terminal block to the frame ground bolt inside the pedestal. Disconnect this wire at the ground bolt.
- 11 Remove the field wiring terminal block:
 - Remove the cover over the terminal block.
 - Remove the four screws that secure the terminal block and lift it out of the pedestal.
- 12 Move the NT7D10 PDU out of the work area.

Installing equipment

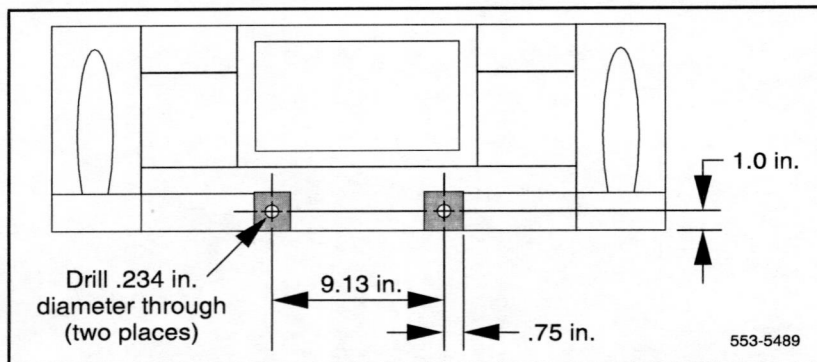
WARNING

The NT7D67CB PDU is much heavier than the NT7D10 PDU.

Note: The conduit attachment plate provided in the NT7D0902 Rear Mount Conduit Kit must be installed as a safety cover and to restrain wiring to the terminal block.

- 1 Drill two .234-in. screw holes in the rear of the pedestal (see Figure 40). The holes will be used to install the conduit attachment plate.

Figure 40
Dimensions for drilling holes on the pedestal

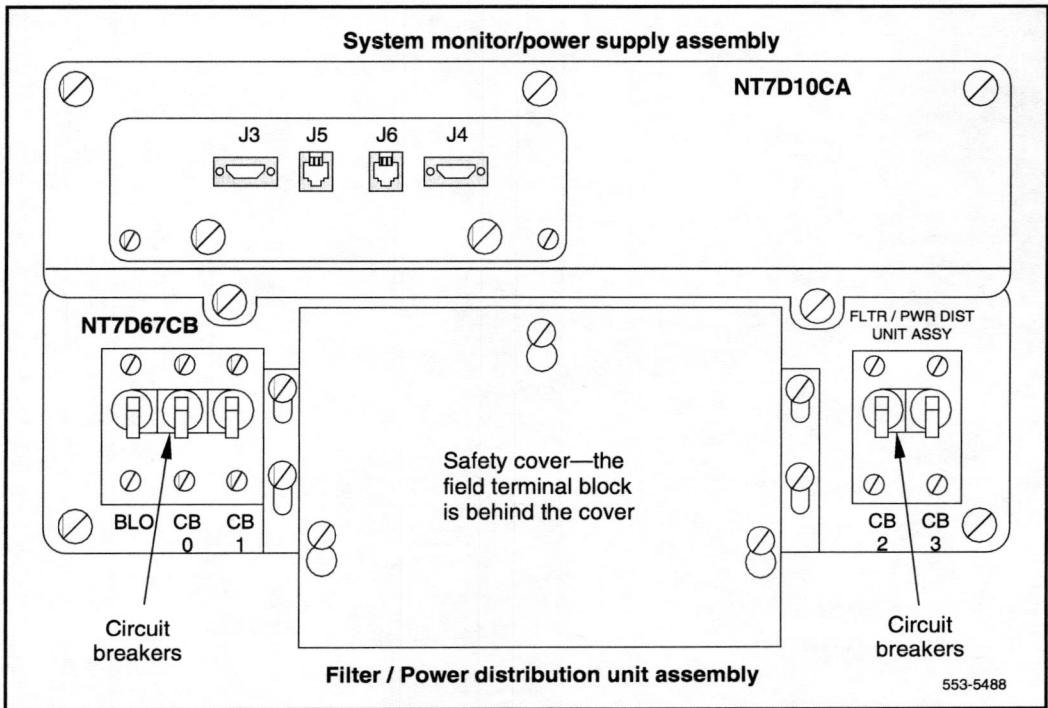


- 2 Place the NT7D67CB PDU next to the pedestal.

Figure 41 shows the PDU (labeled FLTR/PWR DIST UNIT ASSY on the equipment) and the NT7D10CA System Monitor/Power Supply Assembly (labeled XSM/PWR SUPPLY ASSY on the equipment).

Note: The NT7D09CA Pedestal has a brace that supports a leveling bracket on the rear of the PDU. There is no room for the leveling bracket in the NT7D09AA Pedestal, so the bracket must be removed before the PDU is installed.

Figure 41
NT7D67CB Power Distribution Unit DC



- 3 Remove the two screws that secure the leveling bracket on the rear of the PDU. Reinstall the screws to hold the rear cover on the PDU in place.

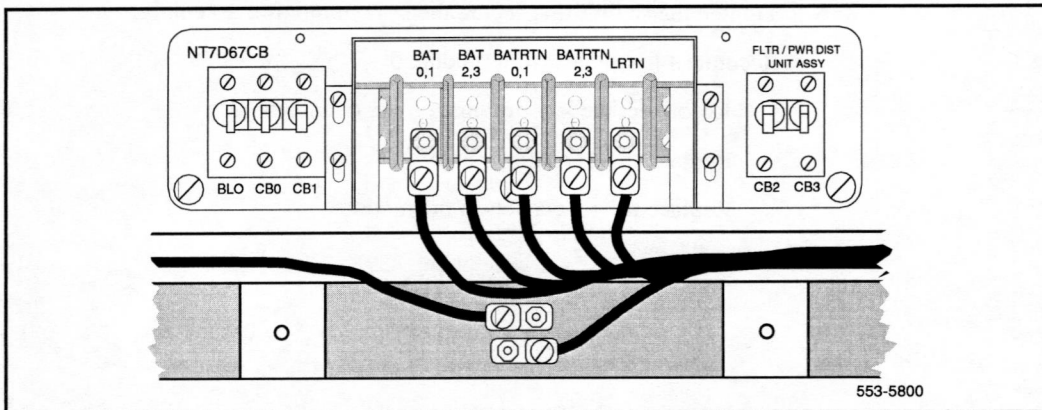
WARNING

You should support the PDU as far into the pedestal as you can without letting it drop to the bottom of the pedestal, but watch your hands! It becomes more difficult to support the PDU the further into the pedestal it is inserted. The PDU is held in its proper position only when the mounting screws on its faceplate are tightened.

- 4** Install the NT7D67CB PDU:
 - Connect the green frame ground wire from the PDU to the frame ground bolt inside the pedestal.
 - Guide the power cable connector through the hole in the top of the pedestal. Set the PDU in the pedestal and tighten the three screws that secure it to the pedestal.
- 5** Install the NT7D10CA system monitor assembly:
 - Connect the small orange connectors (J2 on the PDU, P2 on the system monitor assembly) on the left side of the PDU.
 - Connect the flat white connector to the small circuit board (P1 on the PDU, J1 on the system monitor assembly) on the right side of the PDU.
 - Connect the ribbon cable (set aside when the NT7D10 PDU was removed) to the system monitor (J2). Guide the connector on the other end of the cable through the hole in the top of the pedestal and connect it to module 0.
 - Gently push the system monitor assembly into the pedestal.
- 6** Tighten the screws that secure the system monitor assembly.
- 7** Reconnect the cables from module 0:
 - Reconnect the large orange power connector (J1).
 - Replace the I/O safety panel.
 - Replace the rear cover on the module.

- 8 Reconnect all external wiring to the terminal block on the PDU (see Figure 42):
 - Remove the plastic safety cover over the terminal block.
 - Connect the red BAT (–48 V) wires:
 - for modules 0 and 1 connect to the BAT 0,1 terminal
 - for modules 2 and 3 connect to the BAT 2,3 terminal
 - Connect the black BATRTN (48 V return) wires:
 - for modules 0 and 1 connect to the BATRTN 0,1 terminal
 - for modules 2 and 3 connect to the BATRTN 2,3 terminal
 - Connect the orange (or white) wire from the ground bus/LRE in the power plant to the LRTN terminal.

Figure 42
Field wiring terminals in the NT7D67CB PDU



- 9 Position the conduit attachment plate on the rear of the pedestal (over the newly drilled holes) and secure it with two screws, nuts, and washers.
- 10 Reinstall the plastic safety cover over the terminal block.

- 11** Reseat the blower unit:
 - Lift the unit slightly and slide it into the pedestal glides. Set the toggle switch to ON (right).
 - Tighten the screws on the front of the unit.
 - Replace the front pedestal grill.
- 12** Insert the system monitor card. Tighten the screws on the card faceplate. Reconnect cables to the system monitor.
- 13** Set all five circuit breakers on the PDU to OFF (down). Reconnect the source of DC power.
- 14** One at a time, starting with the breaker for the blower unit, set the circuit breakers on the PDU to ON (up). Make sure the green LED lights on the power supply unit(s) in each module.

Note: On initial power up the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.
- 15** Replace the rear pedestal grill.
- 16** Tag defective equipment with a description of the problem and package it for return to a repair center.

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Meridian 1

Meridian 1

Hardware replacement

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Meridian 1

Meridian Integrated RAN (International)

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About this document

This document provides information about the implementation of the Meridian Integrated RAN (MIRAN) in the Meridian 1 system. It describes the MIRAN operation, installation, configuration, administration, applications, and maintenance.

It focuses on the application and administration of the MIRAN for Recorded Announcement (RAN) and music-on-hold (MOH).

The purpose of this document is to instruct the user how to install, configure, operate, and maintain the Meridian Integrated RAN (MIRAN) as a part of the overall Meridian 1 system.

The following describes what you will find in this document:

Product description describes the MIRAN functional and physical characteristics.

Installation and administration Installation describes how to prepare the Meridian 1 equipment, how to install the MIRAN into the Intelligent Peripheral Equipment (IPE) module or shelf, and how to connect it to the external voice sources and voice delivery devices.

Administration describes the MIRAN configuration, RAN implementation, MIRAN expansion, channel assignment administration, and access security administration.

Telephone set-based OA&M application describes different RAN applications based on use of the telephone OA&M access to record new announcements or to place existing announcement in or out of service.

Terminal-based OA&M application describes different RAN applications based on use of the terminal OA&M access using menus and commands.

Maintenance describes how to perform maintenance functions and how to troubleshoot the MIRAN and the associated equipment.

Appendix A lists the MIRAN display hexadecimal codes and also pin assignment and connector types for external connections to the MIRAN. It also contains an example of how to configure the system for telephone set-based OA&M access.

Appendix B describes reliability, environmental specifications, product integrity, and regulatory standards for the MIRAN.

Description

This chapter describes the NTAG36 Meridian Integrated RAN (MIRAN), both at a system level and at a card level. It describes functions, specifications, applications, engineering guidelines, and operation of the MIRAN.

System overview

The MIRAN is an Intelligent Peripheral Equipment (IPE) card compatible with Meridian 1 options 21E, 51, 51C, 61, 61C, 71, 81, and 81C. It is also compatible with Options 11E and 11C system and SL-1 systems NT and XT upgraded to support IPE cards.

The system software required to support the MIRAN operation must be X11 release 20 or later.

The MIRAN application software is shipped preinstalled in MIRAN.

The MIRAN provides multi-tasking voice processing applications such as recorded announcement (RAN) and music-on-hold (MOH).

The MIRAN communicates with X11 system software using trunk signaling messages over the DS-30X link and emulates the Enhanced Universal Trunk card. The overlays used to configure the Enhanced Universal Trunk card, trunk routes, and trunk functions are used to configure the MIRAN routes.

It provides up to eight internal one-to-one trunk emulation ports/channels and one or two external multi cross-connect channels to support RAN and MOH applications. Each multi cross-connect channel may connect to up to 16 external trunk ports at the MDF.

The largest single MIRAN card provides 8 trunk emulation ports/channels and 2 multi cross-connect channels, for a total of 10 RAN/MOH channels.

PCMCIA Flash memory cards are used to expand the MIRAN message storage memory, to install new RAN and MOH applications, and to backup messages from the MIRAN to the PCMCIA card. If only 4 minutes of message storage capacity is required, it is provided internally in the MIRAN and a Flash memory card would not be necessary for this purpose.

A maximum of 16 MIRAN cards can be linked in a LAN configuration to expand the RAN capacity beyond that provided by a single MIRAN card. This LAN configuration allows one terminal to access any MIRAN in the chain for the purpose of maintaining and configuring individual MIRAN cards and their RAN and MOH applications.

The MIRAN connects to a maintenance terminal over an RS-232 port and to an external music source over an analog I/O port. This port can also be used to input music or voice to a tape recorder. An additional analog port is available on the backplane. A telephone set can also be used to configure the MIRAN, to record new announcements, and to swap existing announcements in and out of service. To use a telephone set, one port out of eight one-to-one ports/channels must be configured as a DID port dedicated to the telephone set.

Figure 1 illustrates the communication bus structure between the MIRAN and the Meridian 1 CPU as well as the Peripheral Controller in the IPE module.

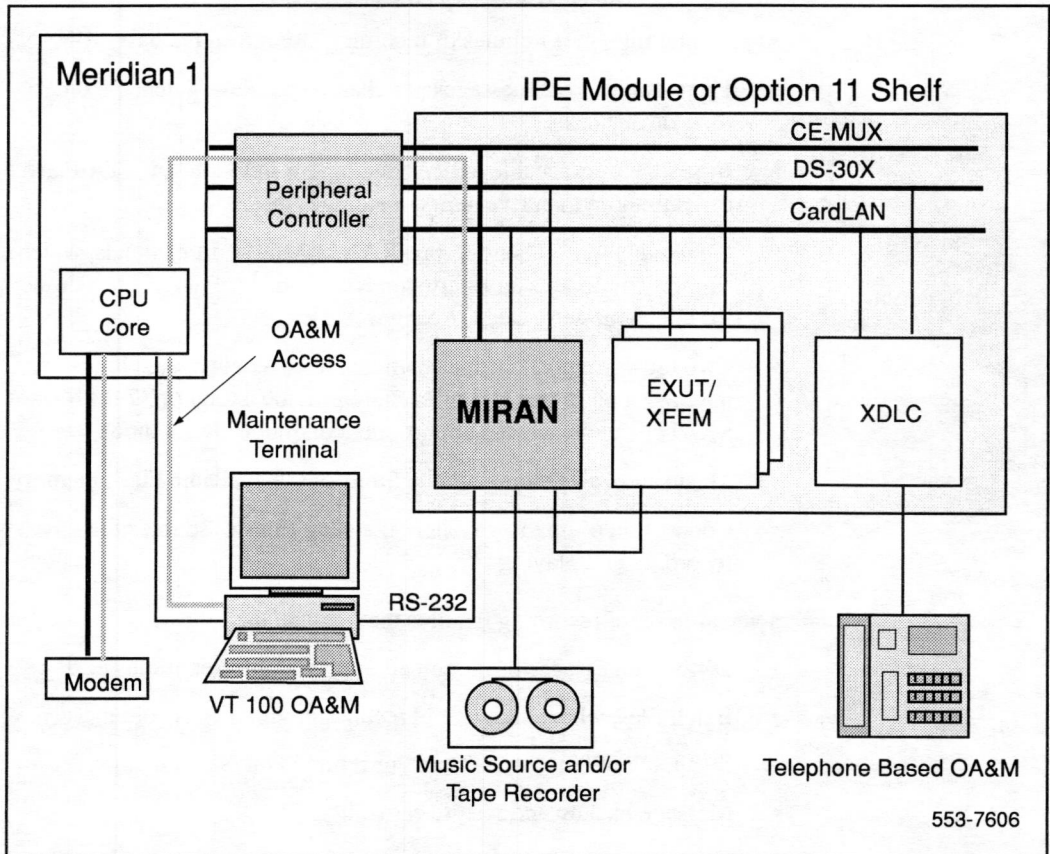
The terminal-based OA&M access is provided by the RS-232 maintenance port on Meridian 1 or Option 11E/11C systems, or, alternatively, over the CE-MUX using the pass-through feature on Options 11E and 11C. The MIRAN can also support Play, Delete, Record, and Assign functions for simple messages using a telephone set-based OA&M.

MIRAN description

The MIRAN emulates the NT8D14BA vintage or greater Enhanced Universal Trunk card. The trunk card software that supports the MIRAN was first introduced in X11 release 20. Software releases prior to X11 release 20 are not capable of supporting the MIRAN.

The MIRAN emulates any DS-30X signaling protocol, including TCM signaling, to be compatible with existing and future terminals and consoles. In addition, MIRAN provides unrestricted access to any one of the 32 voice channels on a DS-30X loop for both voice and data applications.

Figure 1
MIRAN interface structure in the Meridian 1 system



The enhanced flexibility of the MIRAN card provides:

- easily expandable, industry-standard architecture (small, medium, and large configuration controlled by keycode)
- a set of both standard and proprietary interfaces
- compatible with all systems that support IPE cards
- embedded real time operating system
- support for CE-MUX and Card-LAN

- provides simplicity of the basic system (no external devices or cables)
- versatile storage capacity features provide for:
 - A minimum of 4 minutes of recording storage on the base MIRAN
 - Up to 16 different messages per channel per day switchable on a time-of-day basis
 - In-system upgradeable MIRAN with plug-in PCMCIA ATA Flash cards to more than five hours of storage
 - Up to eight internal one-to-one RAN or MOH port/channels, which support continuous and start/stop RAN mode (seven, if one is used for telephone set-based OA&M access)
 - Two cross-connect channels, which are cross-connected to a maximum of 16 trunk ports each, to provide a total of 32 RAN or MOH channels, which support only continuous RAN mode
 - Music and voice storage to the limits of the available Flash memory
 - Connection of up to two external analog (music) sources for recording and playing
- a versatile set of recording features that include the following:
 - Different messages programmed to play at different times of day
 - Batch files, which allow rapid reconfiguration in case of emergency
 - Swapping of “in-service” and “in-reserve” messages using a set
 - Message backup and restore capability
 - Existing announcements can be transferred to the MIRAN
 - New messages recorded over a telephone or from common plug-in audio equipment (e.g., CD players, cassette players, etc.)
 - Password-protected RAN recording from any DTMF telephone set using a simple voice menu interface
 - Music storage up to the limit of available Flash memory
 - Music recording provided on two external analog ports

MIRAN design characteristics

The MIRAN card supports voice processing by providing connectivity to the Meridian 1 system, voice storage capacity, and access to an OA&M facility.

The MIRAN:

- is based on an industry standard 486 processor core
- uses standard interface buses (PCI, ISA, and PCMCIA)
- accesses all 32 DS-30X voice/signaling timeslots
- supports CE-MUX and Card-LAN interfaces
- provides two RS-232 serial ports for maintenance access (through the faceplate Mini-DIN connector and through the backplane connector or MDF). Port B connects to the terminal and port A is used together with port B for daisy-chaining multiple MIRAN cards into a LAN for a single terminal access
- supplies two audio channels for analog access (both input and output)
- provides up to two multi cross-connect outputs for connecting to trunk channels

Table 1 lists specific MIRAN hardware components designed to support RAN and MOH applications in the Meridian 1 and SL-1 systems.

External equipment such as terminals, telephone sets, recorders, and PCMCIA cards are not listed because they are a third party generic products.

Table 1 describes hardware components provided for MIRAN application.

Table 1
MIRAN hardware list

Component	Description
NTAG36 Meridian Integrated RAN (MIRAN)	An IPE card that provides RAN and MOH applications over the Meridian 1 system. (NTAG36 plus security device plus keycode= NTAG88)
NTAG81AA Audio Cable	Connects external analog music source or a recording device to the 3.5 mm Audio Jack on the MIRAN faceplate. This is a splitter cable that provides the audio input signal on one connector and the audio output signal on the other connector.
NTAG81BA Maintenance Extender Cable	A 5-meter (16.4 feet) cable extends the NTAG81CA or the NTAG81DA Maintenance Cables when connecting a terminal to the MIRAN. Has one 9-pin D-Sub male and one 9-pin D-Sub female connectors.
NTAG81CA Maintenance Cable	A 3-meter (9.8 feet) cable that connects the terminal to the MIRAN Mini-DIN maintenance port on the faceplate. It is terminated with a 8-pin Mini-DIN male connector and a 9-pin D-Sub female connector.
NTAG81DA Maintenance Splitter Cable	A 3-meter (9.8 feet) cable connects the Mini-DIN connector on the MIRAN faceplate to a terminal or to an adjacent MIRAN to form a LAN daisy-chain. It has an 8-pin Mini-DIN connector on the common side and two 9-pin D-Sub connectors, one male and one female, on the split side.
NTBK48AA Terminal Cable	Connects Option 11E/11C SDI port to the terminal.
3MB PCMCIA Card	Used for software upgrade and storage.
40MB PCMCIA Card	Used for backup, upgrade, and storage.

MIRAN capacity expansion

If more capacity is required than eight one-to-one trunk emulation ports/channels a single MIRAN can provide, multiple MIRAN cards can be installed. However, if a telephone set is used to record the announcement into the MIRAN, one of eight one-to-one trunk emulation ports/channels must be configured as a DID port to connect the maintenance telephone set to the MIRAN, allowing only seven one-to-one trunk emulation ports/channels for recording announcements. If multiple MIRAN cards are used, you must configure port 7 for each MIRAN card as a DID trunk for telephone set-based OA&M access even though only one telephone set is used.

Up to sixteen MIRAN cards connected in a daisy-chain can be controlled from a single terminal. A low-speed connection between multiple MIRAN cards is possible to allow OA&M facilities on multiple cards to be accessed from a single terminal.

Port/channel expansion

One-to-one recording ports/channels on the basic RAN application emulate the Enhanced Universal Trunk card. Thus, current software can support a voice or music recording capacity of up to eight ports per MIRAN card.

In addition to the eight one-on-one trunk emulation ports/channels, up to two multi cross-connect channels are also provided, ten total ports/channels are available in the largest of the three MIRAN capacity options, as shown in Table 2.

Table 2
MIRAN capacity options

MIRAN capacity option	No. of Multi cross-connect channels	No. of one- to-one ports/channels
Small	1	2
Medium	2	4
Large	2	8

Note: Each MIRAN capacity option consists of the NTAG36 MIRAN card, NTDK57 Security Device, and a Keycode.

Each of the two cross-connect channels can be cross-connected with 16 (600 Ohm) trunks or 16 (900 Ohm) trunks to provide a total of up to 32 trunks.

For each capacity option in Table 2, a MIRAN one-to-one port can be configured for telephone set-based OA&M. Also, note that only one-to-one ports/channels have Enhanced Universal Trunk card emulation; the two multi cross-connect channels do not.

Functional description

The NTAG36 MIRAN software and hardware architecture is an effective implementation of RAN and MOH applications for Meridian 1 and systems supporting IPE cards.

The MIRAN provides faceplate and backplane interfaces, which are used to connect external RAN and music sources and maintenance terminals to the MIRAN. The hardware description provides information on the faceplate connectors and indicators as well as the backplane connections to the MDF.

Software architecture

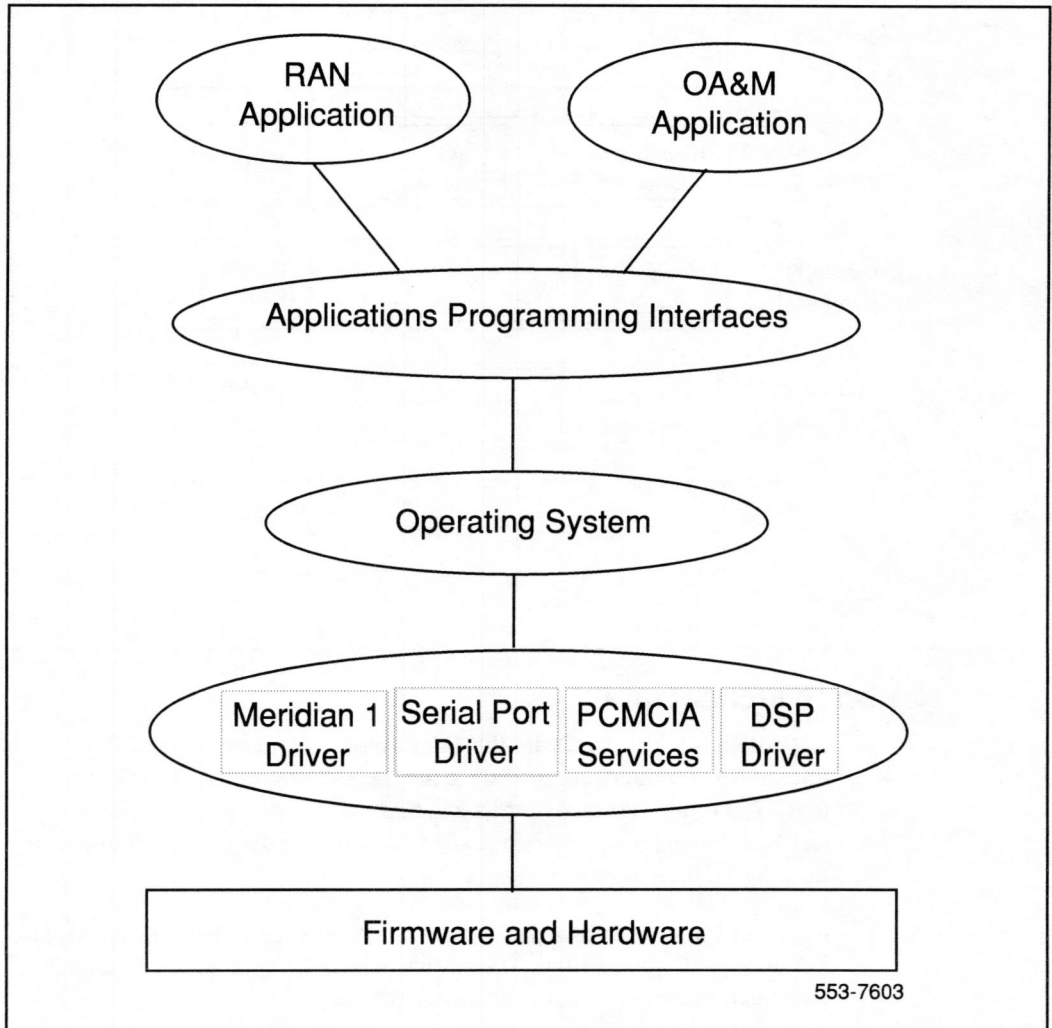
The MIRAN software architecture incorporates the VxWorks real time operating system that allows easy future expansion of features and services.

The MIRAN kernel is an off-the-shelf real-time operating system that supports real-time applications. It supports message queues, pipes, semaphores, asynchronous signals and intertask communication.

The operating system code must be loaded from internal Flash into DRAM unless the MIRAN has a bootable Flash memory card containing the OS code.

Figure 2 illustrates the basic MIRAN software architecture with RAN and OA&M applications, the operating system, and the MIRAN drivers.

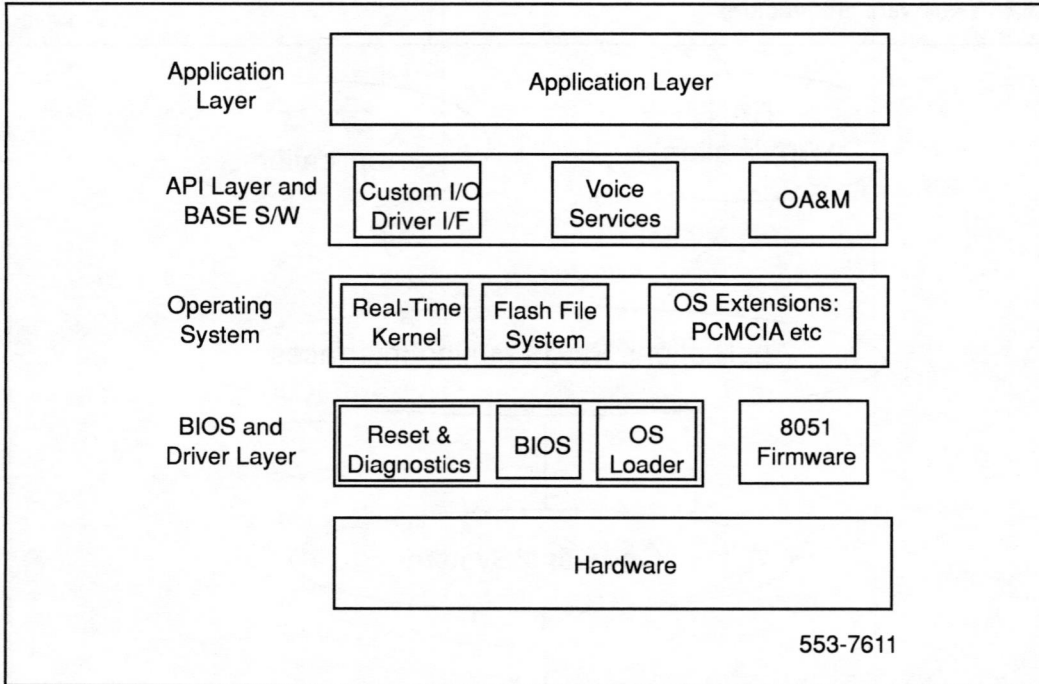
Figure 2
MIRAN software architecture



These procedures initialize the hardware and boot the operating system, using the low level reset, self-test, and BIOS initialization.

Figure 3 illustrates the MIRAN software communication layers.

Figure 3
MIRAN software layers



Hardware architecture

The MIRAN is designed with the 486 microprocessor as its core. The microprocessor interfaces directly to the DRAM array and cache memory and to the rest of the system over PCI and SAI buses. Peripheral interfaces such as RS-232 maintenance interface and PCMCIA interface, connect to one or the other of these buses.

Meridian 1 interfaces such as Card-LAN, DS-30X, and CE-MUX connect to a dedicated microcontroller. This microcontroller communicates with the core microprocessor over the dual-ported RAM.

The RAM within MIRAN is divided into program, data, and buffer areas to satisfy the operating system and application code requirements. It can also provide temporary storage.

To optimize the installation of the MIRAN and the external connections to the MIRAN, it provides faceplate connections for occasional use of the external devices and the backplane or MDF connections for permanent connection of these external devices.

Figure 4 shows the hardware that the MIRAN is replacing and Figure 5 illustrates the basic MIRAN functional blocks. The functions of these blocks are discussed in this chapter following the figure.

Mechanical characteristics

The MIRAN resides in a IPE module card slot of a Meridian 1 system. It can be installed into any IPE card slot in the IPE module or into an SL-1 shelf that supports IPE cards.

Figure 4 shows the MIRAN card to the right of the arrow and the hardware it replaces, to the left of the arrow.

Figure 4
MIRAN and the equipment it replaces

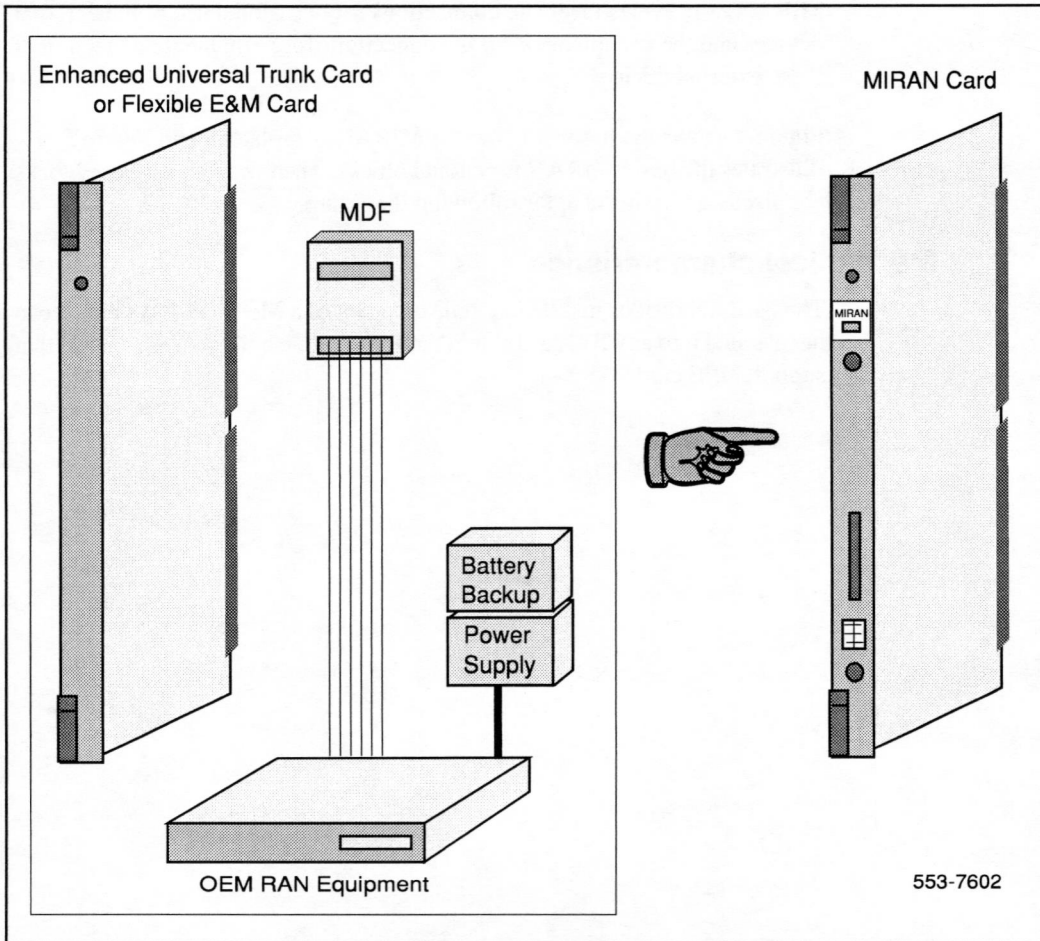
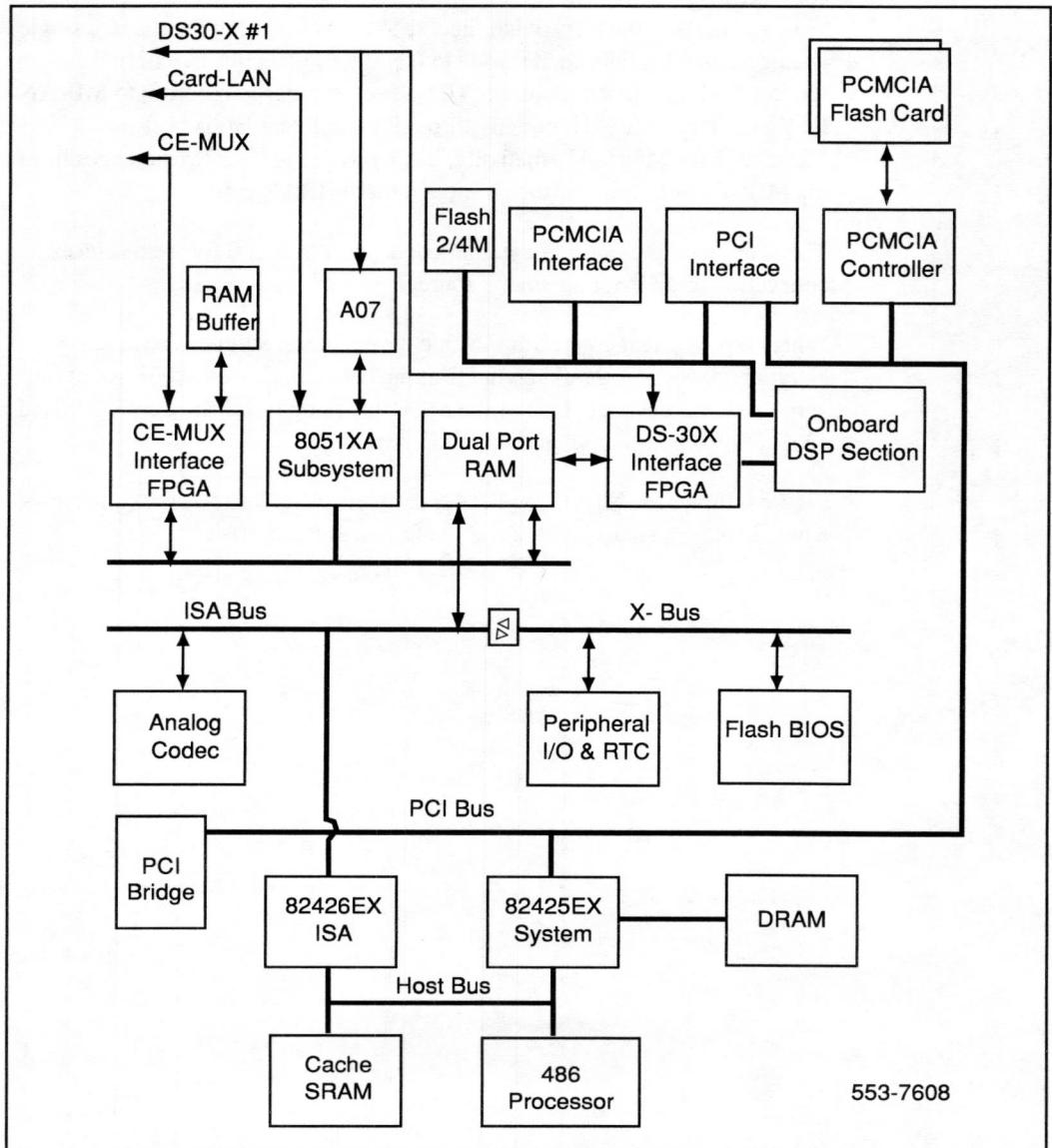


Figure 5 shows a high level block diagram of the MIRAN card components.

Figure 5
MIRAN block diagram



Faceplate connectors and indicators

The MIRAN faceplate provides the following interface connections:

Audio jack

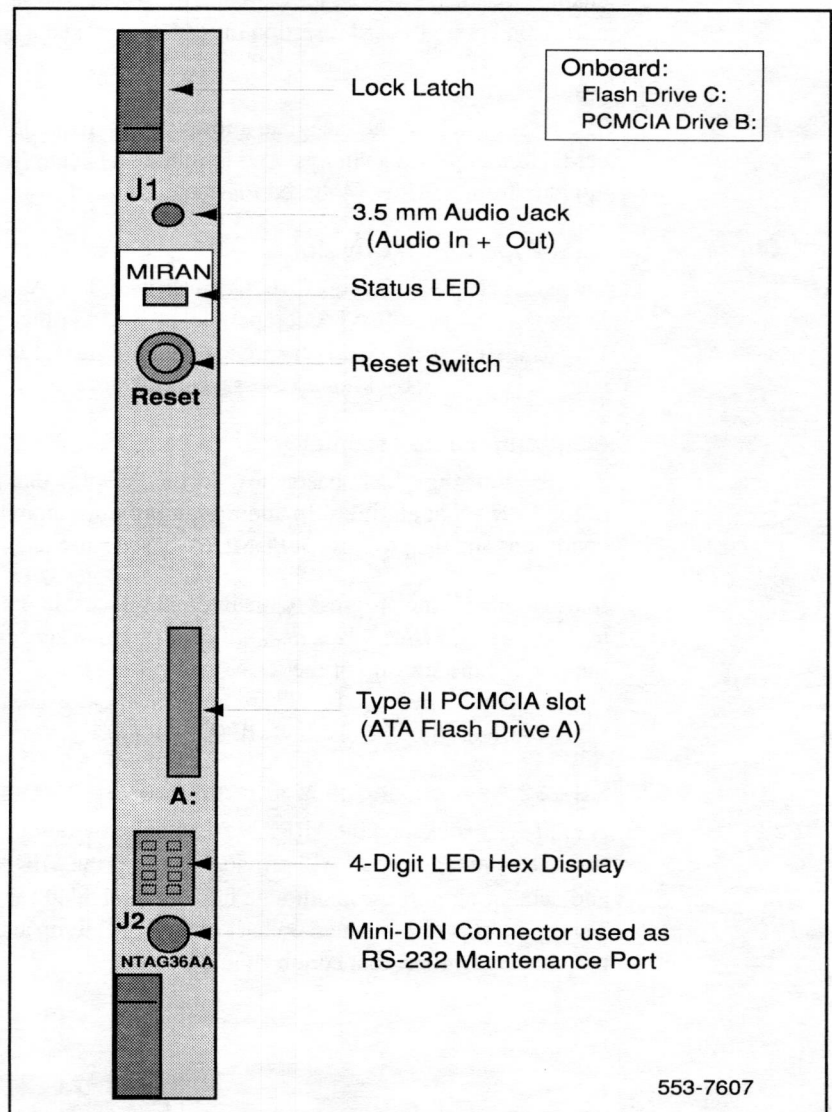
This 3.5 mm audio jack provides access to a single analog input and a single analog output. In addition, it is used to facilitate connection of external analog sources such as a tape recorder or CD player in order to record into MIRAN Flash memory or route it directly through a trunk emulation port into Meridian 1 for MOH. Alternatively, it can be used to back up messages from the MIRAN or to transfer them onto another MIRAN card.

The audio jack provides an external connection to Port 0 for a short term connection of an external analog source.

Where a permanent connection to an external music source is required, the external connection should be made at the backplane or the MDF not at the audio jack. At the backplane or the MDF, the port signals are duplicated and an additional audio input and output is provided.

Figure 6 shows the NTAG36 MIRAN card faceplate. It shows the connectors, a hex display, a status LED, a reset button, and PCMCIA card slots.

Figure 6
The NTAG36 MIRAN faceplate



Status LED

The MIRAN faceplate provides a single red LED to indicate the enabled/disabled status of the card and to indicate the self-testing result during power up or card insertion into an operational system.

Reset switch

The reset switch on the faceplate allows you to manually reset the MIRAN card. Normally, this switch is used to initiate a backup/restore or software upgrade from a PCMCIA-based Flash card or to clear a fault condition.

Dual Type II PCMCIA slot

This slot accepts standard PCMCIA cards including ATA Flash and Hard Disks that are Type II ATA compatible, as well as other peripheral cards as long as their respective drivers are available. This slot is used for MIRAN software upgrade, backing up messages, and storage.

Maintenance hex display

This is a four-digit LED-based hexadecimal display that provides the status of the MIRAN at all times. In addition, it provides an indication of fault conditions and the progress of PCMCIA-based software upgrades or backups.

It also indicates the progress of the internal self-test in the form of T:xx (refer to *Appendix A, MIRAN hexadecimal codes*). Upon successful completion of the test and the start-up of the RAN application, it will display the code "Rann", where **nn** is the LAN card number. If cards are not connected in a LAN configuration the display will show Ra00.

RS-232 Asynchronous Maintenance Port

A mini-DIN socket on the MIRAN faceplate provides access to both RS-232 ports. This faceplate port will provide access to the MIRAN for both OA&M and debugging purposes, although it is only intended for occasional usage. This connector is duplicated on backplane or MDF tip and ring pairs where a permanent terminal connection should be made.

MIRAN backplane connections

In addition to the faceplate connections, the MIRAN provides an on board PCMCIA slot, two external cross-connect channels, audio ports, and RS-232 ports A and B at the backplane. Refer to Figure 16 "Multiple MIRAN card connections over the RS-232 port at the MDF" on page 59. Port B connects to the terminal and port A is used together with port B for daisy-chaining multiple MIRAN cards (up to 16 cards) into a maintenance LAN.

On-board connector for PCMCIA

The MIRAN circuit board has a slot that accepts Type I, Type II, and Type III standard PCMCIA Flash cards. This connector is located on the MIRAN printed circuit board, not on the faceplate. This PCMCIA slot is used for expanding voice and music memory storage.

Multi cross-connect channel connection

Multi cross-connect channels are accessible at the backplane or at the MDF. These two external cross-connect channels can be cross-connected with 16 (600 Ohm) trunks or 16 (900 Ohm) trunks each to provide a total of up to 32 trunks cross-connections. (These channels do not emulate a trunk).

RS-232 port

A serial port is provided on the MIRAN card for maintenance functions. Access to this port is over tip/ring pairs on the backplane or at the MDF where a permanently connected terminal should be connected. This port is also accessible through the MIRAN faceplate mini-DIN connector for an occasional OA&M session and debugging purpose.

Analog ports

The MIRAN supports two analog input ports in order to connect external sources for recording messages and/or music, or, alternatively, to provide two analog channels that can be mapped into up to eight logical RAN units.

The audio jack on the MIRAN faceplate provides access to a single analog input and a single analog output. On the backplane or MDF, however, two analog inputs and two analog outputs are available for backing up stored messages onto audio cassette tape or, alternatively, for connecting to an external paging amplifier.

The left and right channels are independent of each other in order to provide two analog ports for recording and playback. Tip and Ring pairs at the MDF provide the ability to permanently connect the external analog sources to both Port 0 and Port 1.

DS-30X

This interface allows both signaling and timeslot access over standard IPE card.

IPE analog line and trunk cards convert the incoming analog voice and signaling information to digital form and route it to the Meridian 1 CPU over DS-30X network loops. Conversely, digital voice and signaling information from the CPU is sent over DS-30X network loops to the analog line and trunk cards where it is converted to analog form and applied to the line or trunk facility.

A DS-30X network loop is composed of two synchronous serial data buses that transport data:

- One bus transmits data toward the line facility (Tx)
- The other bus receives data toward the Meridian 1 CPU (Rx)

DS-30Y network loops extend between controller cards and superloop network cards, and function similarly to DS-30X loops. Essentially, a DS-30Y loop carries the PCM timeslot traffic of a DS-30X loop, but up to four DS-30Y loops form a *superloop* with a capacity of 128 channels (120 usable timeslots). See the NTP *Meridian 1 system engineering* (553-3001-151).

Card-LAN

This serial communications link is composed of two 19,200 baud asynchronous serial buses, both used by the Meridian 1 Peripheral Controller:

- The output bus, for sending control data to the MIRAN card
- The input bus, to receive the MIRAN card status data

In normal operation, the controller card continually scans (polls) all IPE cards connected to the Card-LAN to monitor their presence and operational status.

The Card-LAN link is used for communicating the basic card maintenance data and reading or programming the Card ID in the memory.

When an IPE line or trunk card is first plugged into the backplane, the system issues XMI002 message to indicate that it detected the card. The self-test is initiated. When the self-test is completed, a properly functioning card responds to the next controller card poll with the self-test status. The controller then queries for card identification and other status information. The controller then downloads all applicable configuration data to the line/trunk card, initializes it, and puts it into an operational mode.

CE-MUX

The CE-MUX interface provides a standard multiplexed CPU bus to allow the MIRAN to emulate standard equipment circuit cards in order to provide Option 11E and 11C maintenance access.

MIRAN reset and self-test functions

Reset is executed immediately following a power-on or system-level reset, this procedure initializes the processor before proceeding with the power-on self-test. The MIRAN attempts to log the source of each reset condition. This information can later be displayed on the maintenance terminal to find the cause of the problem and time and date when it occurred.

Hard reset

A hard reset is equivalent to a card insertion or loss of power. It results in a total reset of all hardware elements and a full hardware and software initialization. A hard reset is always followed by a power-up sequence. This process may last up to 2 minutes.

A hard reset can be initiated by any of the following activities:

- card-level maintenance over the RS-232 port
- Meridian 1 maintenance
- MIRAN sanity reset
- excessive soft resets in a given time period
- by the administrator after upgrading MIRAN software

The excessive soft reset, refers to an attempt at software-level recovery that repeatedly fails. The only other option in that case is to reset the hardware and reload the operating system.

Soft reset

The soft reset re-initializes software elements on the card and corresponds to a reboot of the card. The system checks for the presence of an alternative boot source (e.g., a newly inserted PCMCIA Flash card) during soft resets. This process may last approximately 1 minute. During power up procedure, the system checks first drive A: then drive B: and finally drive C: for configuration information.

A soft reset can be initiated by any of the following:

- card-level maintenance
- Meridian 1 maintenance
- excessive sanity non-maskable interrupts in a given time period

The last situation would arise if a number of unsuccessful attempts were made to recover from a software (or hardware) error condition before exceeding a pre-defined threshold.

Executed immediately after a power-on or reset, this procedure:

- performs a minimum-level of hardware testing
- performs a full diagnostic check
- opens a communication path to an external maintenance terminal so that the MIRAN diagnostic status can be displayed during self test

Diagnostic self-test

This tests the installed hardware:

- determines the integrity of the hardware
- establishes MIRAN configuration in terms of its processor, RAM capacity, and Flash memory.

The MIRAN displays any unexpected results on the maintenance port and updates the Flash configuration. It may also indicate self-test results on the MIRAN faceplate hex display.

BIOS initialization

This process initializes the base hardware, using configuration information stored in Flash. The BIOS layer provides initialization and device drivers.

The BIOS layer initializes the hardware and boots the operating system, using the low level reset, self-test, and BIOS initialization.

Built-in monitoring functions

The operating system provides some form of low level access over a maintenance port for debugging purposes.

Sanity monitoring

This background task checks the sanity of the system, particularly in relation to other tasks that may be tying up CPU or memory resources. It attempts to restore normal MIRAN operation in cases where the performance has degraded to an unacceptable level. If all else fails, this task restarts the MIRAN in order to return to a functional state.

Responsibility for monitoring the MIRAN sanity is shared between the 486 and the 8051XA processors. The latter monitors the 486 by sending periodic diagnostic polling messages to which a response is expected within a given time period. Failure of the 486 to respond initiates a recovery procedure, which repeats the message at least two more times, followed by generating a soft reset to the 486, and eventually a full board-level reset. Failure to recover at that point results in a permanent error code on the hex display.

Error and alarm monitoring

You can access this facility from the OA&M module in order to monitor DS-30X and CE-MUX based messaging both to and from the Meridian 1. This resource can be particularly useful for debugging problems and for verifying functionality.

MIRAN expansion and upgrade

Software may be delivered by PCMCIA Flash card, and software upgrades using Flash PCMCIA. A PCMCIA Flash card without a configuration file is considered voice storage upgrade.

To install software upgrade or expand the port/channel capacity, you must install a new keycode.

Increasing voice storage

You can increase voice storage capacity to the maximum amount available on commercially available PCMCIA memory cards (by more than 5 hours, where each 1 Mbyte of memory provides 2 minutes of recording). Voice storage of up to 4 minutes is available on the basic MIRAN card. The PCMCIA card must be equipped with the ATA driver and an ATA compatible interface.

To expand the voice storage, insert a blank PCMCIA Flash card into faceplate drive A: or internal drive B: (drive C: is used for keycode storage). The MIRAN software checks the Flash card for formatting information. If none exists, the MIRAN will proceed to format the Flash card in DOS format. When formatting is completed, the full capacity of the Flash card will be available for storage. Use the on-board PCMCIA slot for voice memory expansion.

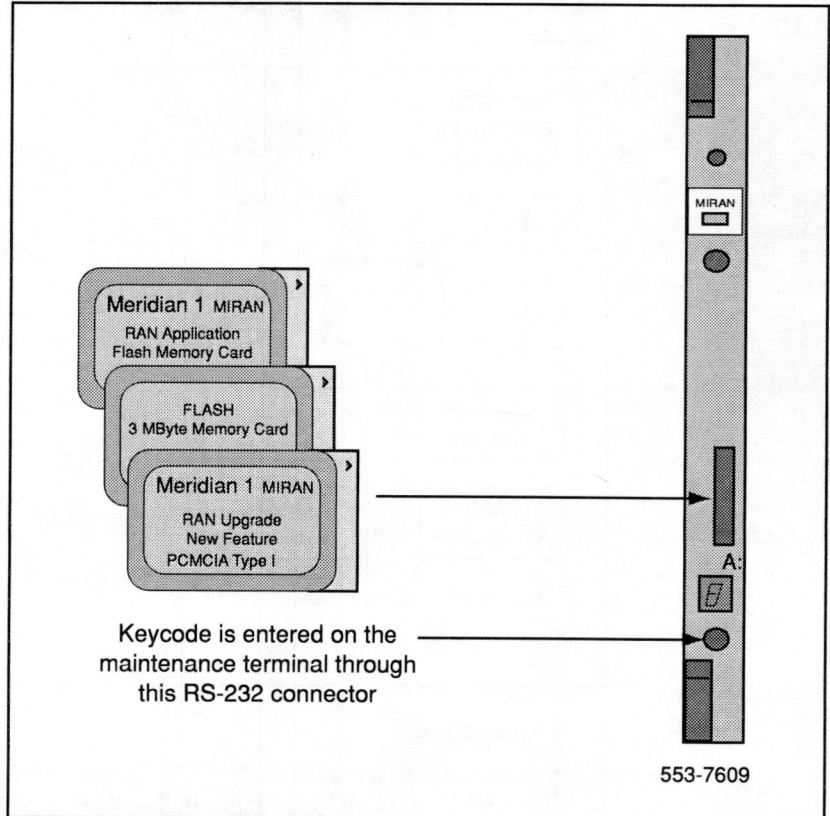
Upgrade using the PCMCIA cards

The faceplate PCMCIA slot (drive A:) is used for MIRAN feature upgrade or bug fixes. To upgrade MIRAN features, you must enter a new keycode. For bug fixes, you don't need a new keycode. MIRAN is compatible with any PCMCIA Flash card supporting the industry standard ATA interface.

When an upgrade PCMCIA card is inserted into the faceplate, the base code recognizes its presence but does nothing until an OA&M administration session takes place. This session instructs the base code how to use the new files and whether any spare Flash memory on the card can be used by a MIRAN application.

Figure 7 illustrates how PCMCIA cards are loaded into the MIRAN faceplate slots to upgrade the MIRAN capacity.

Figure 7
Installing a PCMCIA card into the MIRAN faceplate slot

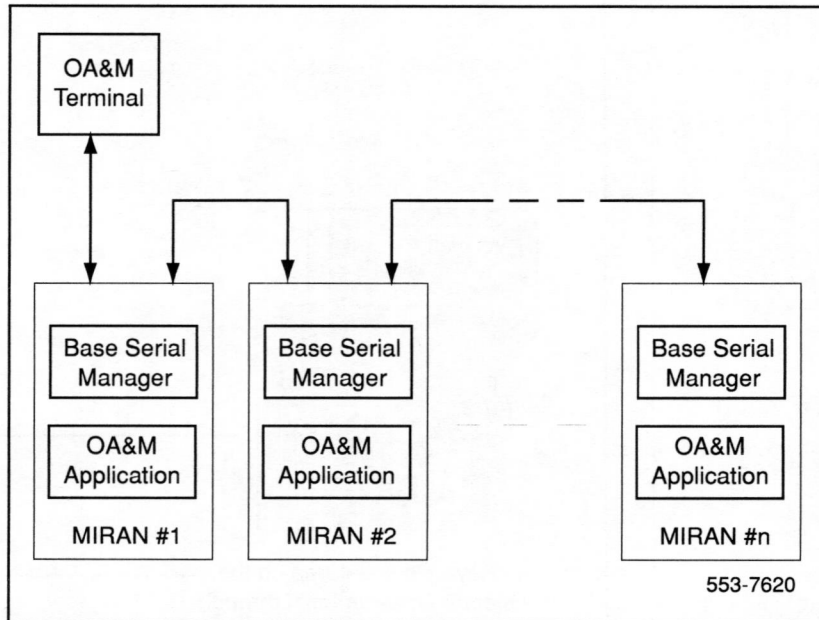


Expansion using multiple MIRAN cards in a LAN

If more MIRAN ports/channels are required than a MIRAN card can provide, up to 16 MIRAN cards may be linked together with maintenance cables to form a MIRAN LAN. For maintenance purposes they are joined together so that only one MIRAN needs to be connected to the maintenance terminal for the terminal to be able to access all MIRAN cards in the chain (in the LAN).

Figure 8 shows the daisy-chain connection of multiple MIRAN card in a LAN, where the OA&M terminal connected to one MIRAN can access any MIRAN in the chain.

Figure 8
Administration of multiple MIRAN card using terminal-based OA&M access



LAN messaging

LAN supports only two types of message, *configuration* and *data*, the latter of which uses the card address to specify the destination of the message. As a card receives a message header, it checks its validity and accumulates and processes the message if the address matches. Otherwise it passes it on to the next card in the chain.

All messages contain a checksum byte to detect errors. Part of the header also contains the number of bytes in the current message from 1 to 8 (excluding bytes in the header and checksum).

While the message for a card down the chain are passed on as they are received, they also accumulate at each node to allow retransmission of the entire message should a checksum failure occur. This reduces the delay in having to retransmit a corrupted message.

Multiple MIRAN message exchange

Because the first card in the chain transmits a LAN configuration message every five seconds, all of the other cards in the chain receive this message every five seconds also. Each card in turn that receives the message has a card ID number one greater than the ID number on the message received by the previous card as the message propagates down the line. If a new card is added at the start of the chain it starts initiating LAN configuration messages that causes all subsequent MIRAN cards to increment their card ID numbers by 1.

First card in chain. If, after power-up, a MIRAN card fails to receive a valid LAN configuration message on Port A (the case for a card connected to a terminal or modem), it assumes that it is the first card in a chain and transmits a LAN configuration message on Port B with a card number of 1. It modifies its faceplate display to show the digit '0'. The card continues to transmit the LAN configuration message at 5-second intervals.

Subsequent cards in the daisy-chain. If after power-up, a MIRAN card receives a LAN configuration message on Port A, it sets its card number to that contained in the message and retransmits the LAN configuration message on Port B with the card number incremented by 1. In this way, card numbers are propagated down the chain. As each MIRAN card receives a new LAN configuration message it updates the maintenance hexadecimal display with the number of the card currently receiving the message. Refer to Appendix A for a list of hexadecimal error codes.

LAN transit delays

At a rate of 9600 baud, each byte takes just over 1ms to transmit. Assuming for a maximum transmission and processing delay of 2ms at each node and allowing for a worst case of 16 cards, the delay to receive a message (assuming no retransmissions) would be:

$$2\text{ms} \times 15 = 30\text{ms (or 60ms for round trip)}$$

Because this delay usually results from data typed at a keyboard, it should not be significant.

Software security

To provide security for the RAN and music applications as well as to prevent unlawful product usage, the MIRAN uses a security device and keycode security approach.

Security overview

A security device and keycode mechanisms are needed to protect against unlawful MIRAN feature usage, because industry-standard PCMCIA cards are used as the software medium on the MIRAN. All upgrades of either channel capacity or application software are restricted to a given MIRAN card and are accurately tracked to allow for satisfactory handling of field repairs and incremental upgrades.

Security is required for the following upgrades:

- port/channel capacity upgrades
- feature enhancements
- new applications

Security is not required for the following upgrades:

- Flash memory capacity expansion
- customer recorded prompts
- backup and restore operations
- application patching/bug fix

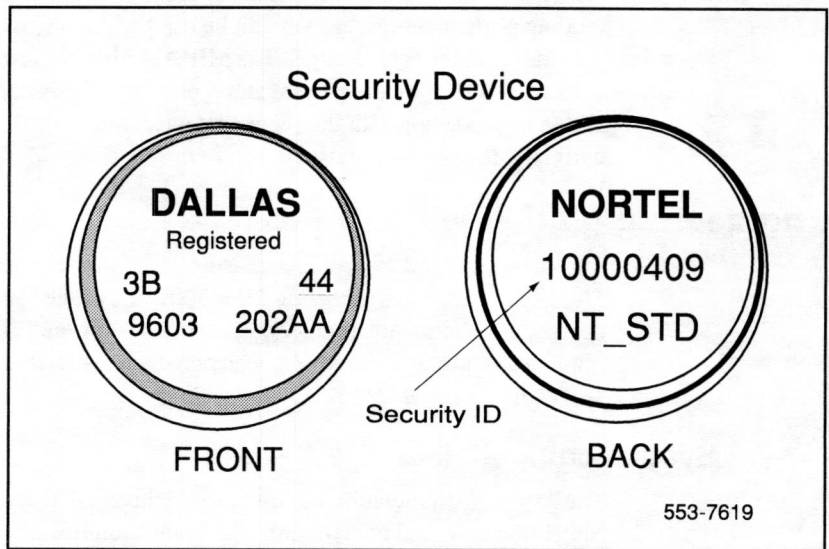
Security device

This button-sized device has a unique 12-digit laser-etched code that cannot be overwritten. In addition, it contains 1kbit of PROM to:

- identify the button as part of a Nortel product
- provide an 8-digit security ID

Figure 9 illustrates an example of a security device that contains a unique 12-digit laser etched code and 1kbit of PROM preprogrammed with Nortel specific information. The back of the security device shows the 8-digit security ID.

Figure 9
Example of a security device



Security ID

The security ID is the number that the customer must query from the MIRAN maintenance port prior to ordering an upgrade. It is read from the security device and it is unique for each MIRAN card.

The security ID can be found:

- at the top left-hand corner of the terminal-based OA&M menu or screen
- by using a command on the telephone set-based OA&M access
- on the shipping paperwork or box

Keycode

Nortel provides the customer with a keycode to enable them to install any desired upgrade. The keycode is entered over a terminal using the local maintenance port on the MIRAN card. The code consists of three sets of eight digits and must match the Security ID on the MIRAN card.

Keycodes can enable additional functionality within an existing application (adding ports, features, etc.) or can be used with a PCMCIA Flash card to provide new software features. The MIRAN comes from the factory equipped with a keycode, however, spare and repaired MIRAN cards are not equipped with a keycode nor with the security device. For the MIRAN to operate correctly, the keycode must be installed.

Engineering guidelines

Meridian 1 general system engineering guidelines are described in *Meridian 1 system engineering* (553-3001-151). The following information deals specifically with engineering guidelines for the MIRAN planning and implementation. For the MIRAN technical characteristics, refer to *Appendix B: Product integrity*.

System compatibility

The MIRAN is emulating the Enhanced Universal Trunk card RAN and MOH functions and uses the existing Trunk Administration LD 14 and Trunk Route Administration LD 16 programs to configure the MIRAN trunk parameters and MIRAN trunk routes.

To support the MIRAN functions, the Meridian 1 system must be running on X11 release 20 if multi-channel RAN mode is not required.

For multi-channel RAN mode support, X11 release 21.41 or later, or X11 release 22.16 or later software, is required.

Note: The multi-channel start/stop control RAN mode allows playing of the same recording independently on multiple channels over the same RAN route.

The MIRAN is supported by:

- Meridian 1 options 21E, 51, 51C, 61, 61C, 71, 81, and 81C (installed in any IPE card slot)

- SL-1 systems NT and XT upgraded to support IPE cards (installed in any IPE slot)
- Option 11E, and 11C (installed in any IPE slot)

MIRAN equipment

The MIRAN equipment can be tailored to meet a specific site and application requirements. You can select the number of ports/channels and the size of the memory required to support current and future requirements. The MIRAN is available in a basic form that provides limited number of ports/channels and minimum memory size. However, the basic MIRAN can be easily upgraded by building on the existing basic platform to expand the number of ports/channels and the memory size.

MIRAN channel capacity options

The MIRAN comes in three port/channel capacity options. These options are listed in Table 3.

Table 3
MIRAN channel capacity options

MIRAN option	Internal One-to-one ports/channels	Multi cross-connect channels	Telephone set based OA&M DID port
Small	2	1	7
Medium	4	2	7
Large	8	2	7 Note
Note: Port/channel number 7 is used as a DID port to connect the telephone set for recording purpose, therefore the large MIRAN option has only seven one-to-one channels available for RAN or MOH.			

For each option configured for a telephone set OA&M, port 7 must be configured as a DID port to connect to the telephone set. In this case, port 7 of the large MIRAN option with eight one-to-one internal ports/channels is used to connect to the telephone set for recording purpose and cannot be used for RAN or MOH application. Port/channel 7 may be reconfigured for RAN and MOH when not used for telephone set-based OA&M access.

The small and medium MIRAN options continue to have all one-to-one ports/channels available for RAN and MOH because port/channel 7, which is used for telephone set- based OA&M connection, is not active for RAN and MOH in those two options.

Supported RAN modes

The MIRAN card supports the following RAN modes for the internal and the external channels:

- Internal one-to-one ports/channels support continuous and start/stop RAN and MOH modes.
- Internal one-to-one ports/channels support start/stop multi-channel RAN and MOH modes.
- External cross-connect channels support delay dial and immediate, continuous RAN and MOH modes.

Note: MIRAN supports Auto-Wake-Up. To configure this feature on MIRAN, refer to Automatic Wake Up in *X11 features and services* (553-3001-305)

Voice storage capacity

The MIRAN storage capacity can be expanded by installing PCMCIA ATA Flash cards into either the faceplate A: slot or the internal B: slot. However, Nortel recommends that the internal slot B: be used for voice storage and the faceplate drive A: be used for software upgrades.

Table 4 lists the memory size and the corresponding message recording time.

Table 4
MIRAN voice storage capacity expansion

Memory allocation	Recording time
Base MIRAN card memory	4 minutes
Base plus 40 MB Flash memory	84 minutes
A PCMCIA card 170 MB	340 minutes
Each additional 1 MB of Flash memory	2 minutes

Feature enhancement The customer would be provided with a pre-programmed PCMCIA Flash card, which contains either feature enhancements or completely new applications. The keycode is required for this upgrade and can be entered on the TTY or terminal, or by using a keycode file on the PCMCIA Flash card.

Multi cross-connect channel characteristics

Table 5 displays electrical specifications for the MIRAN RAN cross-connect interface.

Table 5
Characteristics of the multi cross-connect channel

Characteristic	Specification
Terminal impedance	*600/900 ohms
Supervision type	Continuous, level, or pulse
DC signaling maximum loop length	600/900-ohm loop
Ground potential difference	± 1 V
* Up to 16 trunks with 600 Ohm and 16 trunks with 900 Ohm can be cross-connected.	

Power and ground requirements

Power to the MIRAN is provided by the IPE module power supply (AC or DC).

Note: Power supplied at the IPE module backplane at each card slot exceeds the power requirement for each MIRAN card. Therefore, there is no restriction on the number of MIRAN cards in the IPE module. If you are using hard drives that are powered by the IPE module, make sure that the total power requirements does not exceed power available for that card slot.

Table 6 displays the MIRAN power requirements. All values assume the use of a 3.3V processor.

Table 6
MIRAN power requirements

Configuration	+/-15V	5V	Total Power
Basic 8-port/channel	7.0 W	8.0 W	15 W
8-port/channel \pm 4MB Flash	7.0 W	8.3 W	15.3 W

The maximum IPE module per slot power budget is 30 Watts, with an effective limitation of 20 Watts for thermal compensation. A DC/DC converter is used to provide the 3.3 volts required by the 486 processor and the PCMCIA interfaces.

Note: Power supplied at the IPE module backplane at each card slot exceeds the power requirement for each MIRAN card. Therefore, there is no restriction on the number of MIRAN cards in the IPE module.

Table 7 shows the maximum current required from each power supply rail.

Table 7
Backplane power available (per card slot)

Supply Rail	Available on backplane	With DC-DC converter	MIRAN
3.3 V	—	2400 mA	8 W
5 V	2000 mA	2000 mA	10 W
+/- 15 V	800 mA	366 mA	10 W

The processor contains three separate grounds: logic, analog, and frame. Logic ground is connected to the processor ground. The codec has its own separate analog ground that connects to the logic ground at a single point.

No connection between logic ground and frame ground is provided on either the processor or the expansion board. Instead, these two grounds are connected at the shelf where the MIRAN card is installed.

Each MIRAN I/O port routed to the backplane has its own ground to simplify connections.

External equipment

The MIRAN can perform RAN applications without any external connections. However, to perform OA&M sessions, connect external music sources to the MIRAN, to record RAN messages or music, you must connect the external devices to the MIRAN faceplate connectors, or to the backplane or MDF tip/ring pairs.

VT100 type terminal

A VT100 terminal or a personal computer emulating a terminal is used to perform RAN and MIRAN administration, access and configuration of any MIRAN in a LAN configuration of up to 16 MIRAN cards in a daisy-chain, and maintenance and diagnostics of each MIRAN.

A maximum of 16 MIRAN cards can be daisy-chained into a LAN connection to provide access to each MIRAN card from a single terminal.

A terminal can use:

- a menu system to perform administrative and maintenance functions, or
- commands that are entered on the command line

The terminal must be connected to the MIRAN RS-232 interface. The connection can be made:

- at the mini-DIN connector on the MIRAN faceplate using the NTAG81CA or NTAG81DA Maintenance Cable for occasional use, or
- at the MDF tip/ring pairs using a terminal cable that must be less than 50 feet long (cable not supplied)

For a Single Terminal Access (STA), MIRAN can be connected to an MSDL port operating in the STA mode. This way, MIRAN and other application cards installed in the system can be accessed from a single terminal.

Terminal interface must be set at 9600 baud, 8 data bits, 1 stop bit, and no parity. The flow control is not supported.

Table 8 lists the terminal-based OA&M access method for different system options over the SDI or MSDL ports.

Table 8
Terminal-based OA&M access for different system options

System option	Access description
Option 11/11E - remote	Connect a modem to the MIRAN RS232 Port B via the backplane tip/ring pairs. For multiple cards, use VLAN and connect the first card in the chain to the modem.
Option 11/11E - local	Connect a PC or terminal directly to the MIRAN RS232 Port B via the faceplate connector and maintenance cable or via the backplane tip/ring connections. For multiple cards, use VLAN and connect the first card in the chain to the terminal/PC.
Meridian 1 Options 21-81C	Use STA feature on the MSDL card where MIRAN is one of the monitored systems. For multiple cards, use VLAN and connect the first card in the chain to the MSDL.
Option 11C - CEMUX passthru	Configure MIRAN as an LSSL in OVL 17 and use AX <port no.> command at the system TTY to passthru to MIRAN (no cabling required). Multiple MIRAN cards can be given different port nos. Card must be in the main cabinet.
Option 11C - Cabled passthru	Connect MIRAN to CPU port 1 or 2 via the maintenance cable and 9 to 25 way adapter. Configure port as LSSL. Use AX <1> or <2> to passthru to MIRAN. Can use VLAN for multiple cards. Card may reside in the expansion cabinet.

Telephone set for OA&M access

No external connections are required as long as you use an existing telephone in the system.

To perform a telephone set-based OA&M access, you have to set one of the internal one-to-one MIRAN ports/channels (port 7) to be a DID trunk in the Meridian 1 system. The DID trunk route makes the MIRAN port 7 accessible by using a route access code from any telephone in the system. To access a MIRAN a valid password must be entered. Small and medium size MIRAN options also use port 7 for telephone set OA&M access.

External analog sources

The external analog sources provide a facility to connect tape recorders, CD players for recording onto the Flash memory on the MIRAN, or to record messages from the MIRAN onto a tape for backup, or to record these backed up messages to an other MIRAN card. Refer to Figure 14 “Analog device connection at the MDF” on page 55 in the *Installation and administration* section.

You can connect these external analog sources to the:

- 3.5 mm Audio Jack on the MIRAN faceplate (one input and one output) by using the NTAG81AA Audio Cable
- at the backplane or the MDF tip/ring pairs (cable not supplied)

Engineering a MIRAN RAN and music application

Based on the options of the MIRAN equipment, external equipment, and your RAN and MOH requirements, you can engineer a MIRAN system to meet your system requirements.

The following five examples illustrate what equipment is required for a specific site (application) requirements. It also discusses the alternatives available for interconnection of multiple MIRANs and connection of external devices to the MIRAN.

Example 1:

Application requirements:

- Provide three internal RAN channels and one external cross-connect channel to cross-connect 10 trunk ports.

- Provide 1 hour of recording space on the MIRAN card.
- Provide telephone set-based OA&M access.

Equipment requirements:

- one medium MIRAN
- one 40 MB PCMCIA ATA Flash card
- two Enhanced Universal Trunk cards or three Flexible E&M cards

Example 2:

Application requirements:

- Provide multi-channel level start/stop control RAN mode for four internal RAN channels and two external cross-connect channels to cross-connect 30 trunk ports.
- Provide 4 minutes of recording space on the MIRAN.
- Provide terminal-based OA&M access.

Equipment requirements:

- one medium MIRAN
- four Enhanced Universal Trunk cards or eight Flexible E&M cards
- one NTAG81CA Maintenance Cable (to connect the terminal to the mini-DIN connector on the MIRAN faceplate), or alternately
- a terminal-to-MDF cable where total distance from the MIRAN through the MDF to the terminal is less than 50 feet

Note: In this mode, all four ports/channels are playing the same announcement independently over the same RAN route.

Example 3:

Application requirements:

- Provide seven internal RAN channels and two external cross-connect channels to cross-connect 30 trunk ports.
- Provide 1 hour of recording space on the MIRAN.
- Provide terminal-based OA&M access.

Equipment requirements:

- one large MIRAN
- one 40 MB PCMCIA ATA Flash card
- four Enhanced Universal Trunk cards or eight Flexible E&M cards
- one NTAG81CA Maintenance Cable (to connect the terminal to the mini-DIN connector on the MIRAN faceplate), or alternately
- a terminal-to-MDF cable where total distance from the MIRAN through the MDF to the terminal is less than 50 feet

Example 4:**Application requirements:**

- Provide 11 internal RAN channels and 3 external cross-connect channels to cross-connect 40 trunk ports.
- Provide 1 hour of recording space on the MIRAN.
- Provide telephone set-based OA&M access, and
- Provide terminal-based OA&M access.

Equipment requirements:

- one large MIRAN with 40 MB PCMCIA ATA Flash memory, and
- one medium MIRAN
- five Enhanced Universal Trunk cards or ten Flexible E&M cards
- two NTAG81DA Maintenance Splitter Cable (to inter-connect the two MIRAN cards to their respective mini-DIN connectors on the MIRAN faceplate and to connect the terminal), or alternately
- cross-connect the RS-232 ports of the two MIRAN at the MDF and use a terminal-to-MDF cable to connect the terminal to one MIRAN if the distance between the MIRAN and the terminal through the MDF is less than 50 feet

Note: The total number of internal one-to-one ports/channels are 12. Even though we have a telephone set-based OA&M, if we use port 7 of the small MIRAN card we do not lose an active channel and have all 12 channels available for RAN or MOH applications.

Example 5:

Application requirements:

- Provide 14 internal RAN channels and 4 external cross-connect channels to cross-connect 60 trunk ports.
- Provide 1 hour of recording space.
- Provide two external analog (music) sources
- Provide telephone set-based OA&M access, and
- Provide terminal-based OA&M access.

Equipment requirements:

- two large MIRAN with 40 MB PCMCIA ATA Flash memory
- eight Enhanced Universal Trunk cards or fifteen Flexible E&M cards
- two NTAG81AA Audio Cables to connect external analog sources, or instead of using the NTAG81AA cables, you can connect the external analog sources at the MDF
- one NTAG81DA Maintenance Splitter Cable (to inter-connect the two MIRAN cards to their respective mini-DIN connectors on the MIRAN faceplate and to connect the terminal), or alternately
- cross-connect the RS-232 ports of the two MIRAN at the MDF and use a terminal-to-MDF cable to connect the terminal to one MIRAN if the distance between the MIRAN and the terminal through the MDF is less than 50 feet

Note: The total number of internal one-to-one ports/channels are 16. However, we have to use port 7 of one of the MIRAN as a DID port to connect a telephone set-based OA&M, therefore only 15 channels are available for RAN or MOH applications.

Installation and administration

This chapter describes the installation of the NTAG36 Meridian Integrated RAN (MIRAN). It describes how to install the MIRAN, how to connect it to a terminal for a terminal-based OA&M access, and how to connect the external analog sources for recorded announcement (RAN) and music-on-hold (MOH) to the MIRAN. It also describes the basic administration procedures used to maintain, modify, and expand the MIRAN functions.

Installation overview

The RAN service can be added to existing Meridian 1 system options 21E, 51, 51C, 61, 61C, 71, 81, and 81C as well as Options 11E, 11C and SL-1 systems that supports IPE and Enhanced Universal Trunk cards, originally installed and operating without MIRAN, or it can be an integral part of a newly installed Meridian 1 system.

The installation of the MIRAN into the Meridian 1 should begin after:

- A previously installed Meridian 1 system is upgraded to run on generic software X11 release 20 or higher, if multi-channel RAN control mode is not required. If multi-channel RAN control mode is required, the system must be running on generic software X11 release 21.41 or higher, or X11 release 22.16 or higher. For more information, refer to “Multi-channel level start/stop control RAN” on page 65.
- A newly installed system using the latest generic software X11 release 22.16 or higher.

To install a new Meridian 1 system or expand an existing one, refer to *Meridian 1 system installation procedures* (553-3001-210). It provides the information on how to install, verify, and maintain the Meridian 1 system.

To complete the installation of a MIRAN, you should follow the general procedures listed below.

These procedures include:

- Preparing the site
- Unpacking, inspecting, and taking inventory of the equipment
- Installing the MIRAN card in the selected IPE card slot, if not already installed
- Installing the cables between the MIRAN faceplate connectors and external devices, if required
- Installing the cables between the backplane connectors on the IPE module and the I/O panel connectors at the rear of the module, if required
- alternately installing the cables at the MDF to connect external devices to the MIRAN
- Connecting multiple MIRAN cards in a daisy-chain, if required

Installation preparation

The preparation consists of unpacking and inspecting components, taking inventory, and locating the IPE card slots where the MIRAN will be installed.

Unpacking and inspection

Unpack and inspect the equipment for damage. When unpacking, follow general precautions recommended by computer and telephone equipment manufacturers:

- Remove items that generate static charge from the installation site.
- Use antistatic spray if the site is carpeted.
- Ground yourself before handling any equipment.
- Remove equipment carefully from its packaging.
- Visually inspect the equipment for obvious faults or damage. Any damaged component must be reported to your sales representative and the carrier who delivered the equipment.

Taking inventory

After the equipment has been unpacked and visually inspected, verify that all the equipment is at the site before the installation begins. Equipment received must be checked against the shipping documents. Any shortages must be noted and reported to your sales representative.

Locating the card slot

A MIRAN card can be installed in any IPE card slot in an IPE module or shelf that has a 25-pair tip/ring cable connected between the backplane and the I/O panel. The only card slot that cannot be used is the Peripheral Controller card slot labeled *Cont.*

In Options 11E and 11C cabinet, the MIRAN card can be installed in any IPE card slot from 1 to 10.

Note: If the backplane RS-232 connections are used, the MIRAN card cannot be installed in IPE card slots 3, 7, 11, or 15, since the required tip/ring pairs in these slots are not available at the MDF.

Verifying MDF wiring

The MIRAN interfaces appear on the IPE module's backplane. The backplane is cabled to the input/output (I/O) panel at the rear of the IPE module, which is then connected to the Main Distribution Frame (MDF) by the 25-pair cable.

Trunks connect to the two MIRAN multi cross-connect channels at the MDF, as shown in Table 9. The two MIRAN multi cross-connect channels wiring is shown in Figure 10.

CAUTION

Do not install a MIRAN card into IPE card slots that are wired to line cards. Line cards are configured with ringing voltage, which, when applied to MIRAN, may damage the card.

Table 9 lists the 25 tip/ring pairs for the MIRAN card installed in the IPE module. It shows the wire color code at the MDF to facilitate cross-connect to the external terminal equipment or trunk tip/ring pairs.

Table 9
NT8D37 IPE Module MIRAN pair termination (I/O panel to MDF cable)

Pair	Pin No	Pair color	MIRAN Assignment
1T/1R	26/1	W-BL/BL-W	RANAT0/RANAR0
2T/2R	27/2	W-O/O-W	CNTRPLS0/GRD
3T/3R	28/3	W-G/G-W	RANAT1/RANAR1
4T/4R	29/4	W-BR/BR-W	CNTRPLS1/GRD
5T/5R	30/5	W-S/S-W	AGRD/AGRD
6T/6R	31/6	R-BL/BL-R	No connection
7T/7R	32/7	R-O/O-R	AIN1/AIN0
8T/8R	33/8	R-G/G-R	AIN3/AIN2
9T/9R	34/9	R-BR/BR-R	No connection
10T/10R	35/10	R-S/S-R	Reserved
11T/11R	36/11	BK-BL/BL-BK	Reserved
12T/12R	37/12	BK-O/O-BK	Reserved
13T/13R	38/13	BK-G/G-BK	Reserved
14T/14R	39/14	BK-BR/BR-BK	Reserved
15T/15R	40/15	BK-S/S-BK	Reserved
16T/16R	41/16	Y-BL/BL-Y	BDCDA-/Reserved
17T/17R	42/17	Y-O/O-Y	BSOUTA-/BSINA-
18T/18R	43/18	Y-G/G-Y	SGRD/BDTRA-
19T/19R	44/19	Y-BR/BR-Y	BRTSA-/BDSRA-
20T/20R	45/20	Y-S/S-Y	BSINB-/BCTSA-
21T/21R	46/21	V-BL/BL-V	BDCDB-/BSOUTB-
22T/22R	47/22	V-O/O-V	BDSRB-/BDTRB-
23T/23R	48/23	V-G/G-V	Reserved
24T/24R	49/24	V-BR/BR-V	Reserved
25T/25R	50/25	V-S/S-V	spare

Note: Each of the following I/O panel connectors is cabled as shown above: connectors A, B, C, D, E, F, G, K, L, M, N, R, S, T, and U. These connectors are associated with card slots 0 through 15 in the IPE module.

Identifying multi cross-connect channels at the MDF

The MIRAN external multi cross-connect channels are routed from the IPE module backplane to the MDF over the 25-pair tip/ring cable. These two cross-connect channels can be connected up to a maximum of 32 trunks (or to 16 each) at the MDF providing 32 RAN and MOH application channels.

Table 10 lists the NTAG36 MIRAN card pair termination for the two external cross-connect channels that connect to multiple trunks. It lists the pinout and the cable wire color code for the two MIRAN external channels. Each of these two external MIRAN channels can cross-connect to up to 16 trunks for a total of 32 RAN channels.

Table 10

NT8D37 IPE Module: NTAG36 MIRAN external cross-connect channels

MIRAN Pair	25-pair cable Pin No	Pair color code	MIRAN Port
1T/1R CP/MB	26/1 27/2	W-BL/BL-W W-O/O-W	A0
3T/3R CP/MB	28/3 29/4	W-G/G-W W-BR/BR-W	A1
Note: The MIRAN has up to 8 internal one-to-one ports/channels (0-7) and two external multi cross-connect channels (A0 and A1).			

Figure 10 illustrates connection of the two MIRAN external multi cross-connect channels from the IPE module I/O panel to the MDF cross-connect terminals and from the MDF to the multiple trunks for Enhanced Universal Trunk wiring.

Figure 10
MIRAN multi cross-connect channels relative to the EXUT wiring

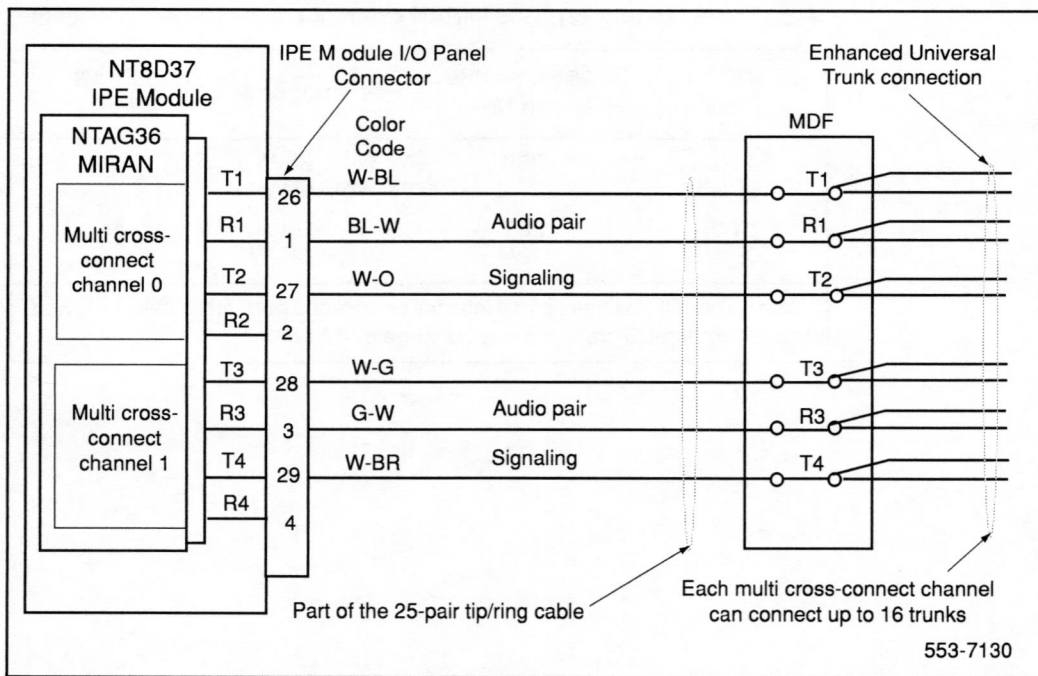
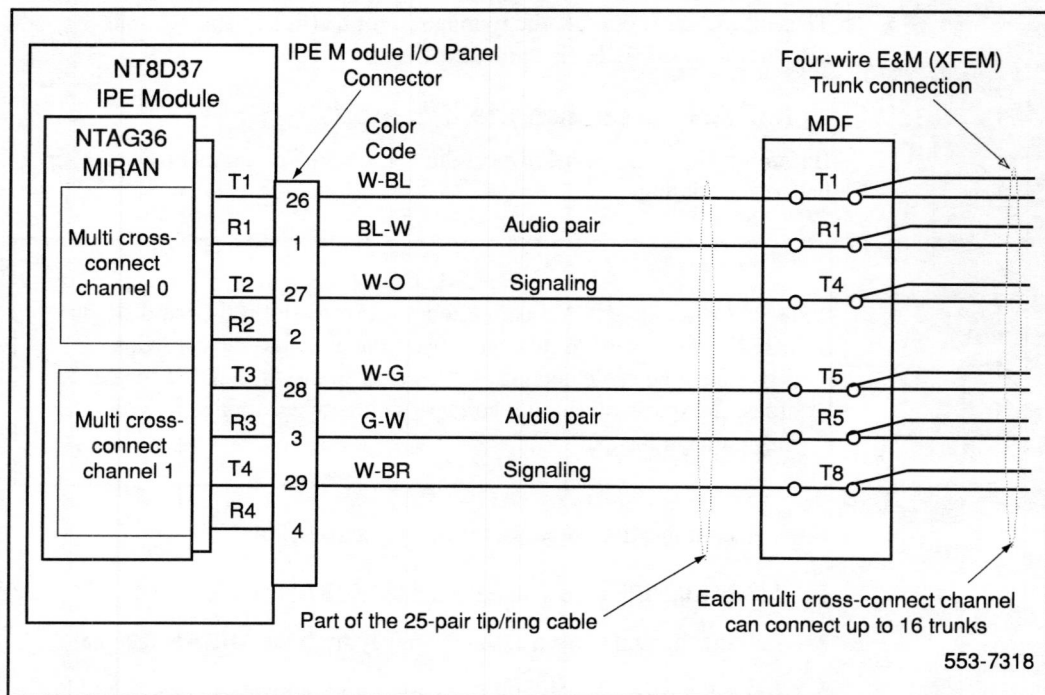


Figure 11 illustrates a connection of the two MIRAN external multi cross-connect channels from the IPE module I/O panel to the MDF cross-connect terminals and from the MDF to the multiple trunks for 4-Wire E&M trunk wiring.

Figure 11
MIRAN cross-connect channels relative to the XFEM wiring



MIRAN equipment installation

The installation of the MIRAN and the external equipment connections associated with the MIRAN should start after:

- verifying that the preinstallation preparation has been completed (this includes verifying that all the equipment has been received undamaged, that the IPE module has 25-pair cables connected from the backplane to the I/O panel and from there to the MDF)

- planning you MIRAN equipment, port and memory capacity, and external equipment connection configuration using *Engineering guidelines* in the *Description* section of this document
- procure external connection cables not provided with Nortel equipment, if required (these are cables that connect the terminal and external analog sources to the MDF cross-connect instead of the MIRAN faceplate)

These three items provide the foundation for a efficient and accurate installation of the MIRAN hardware.

Installing MIRAN cards into the IPE module

Before you install the card inspect the IPE module or cabinet I/O panel or backplane cabling.

CAUTION

Do not install a MIRAN card into an IPE card slot if that card slot is wired to a line card. Before you insert the card into the card slot, disconnect the cable connecting this card slot to the MDF. Line cards are configured with ringing voltage, which, when applied to MIRAN, may damage the card.

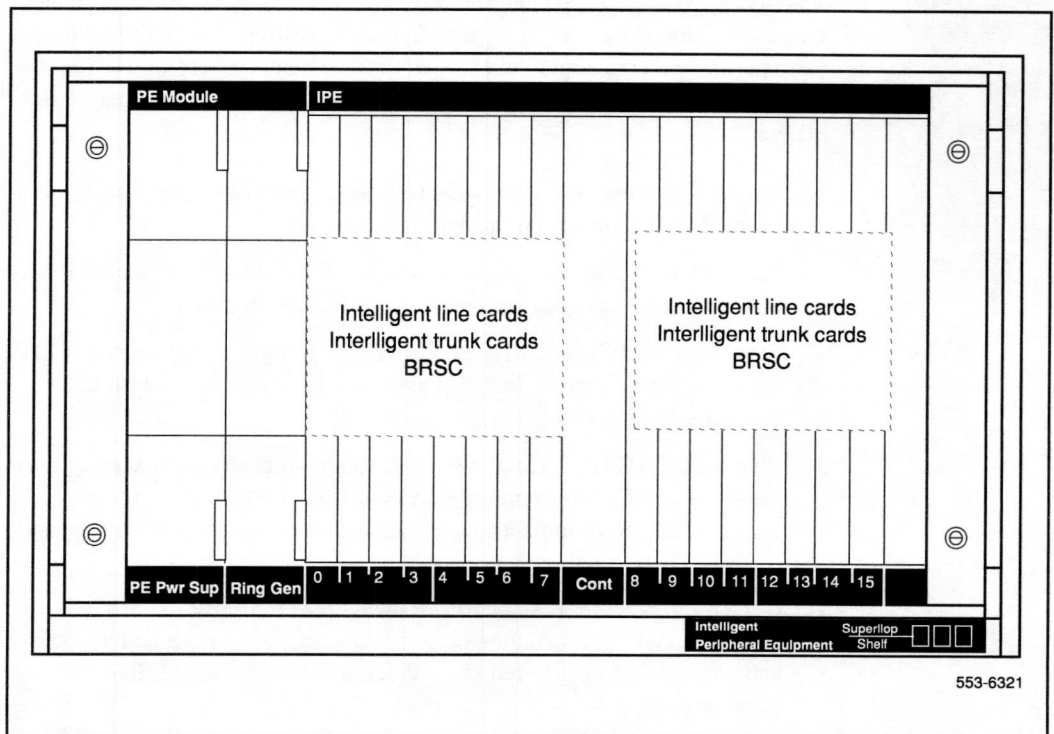
When installing MIRAN cards, follow the steps bellow:

- 1 Identify the IPE card slots selected for MIRAN card(s)
- 2 Pull the top and bottom extractors away from the MIRAN faceplate.
- 3 Insert the MIRAN card into the card guides and gently push it until it makes contact with the backplane connector.
- 4 Push the top and the bottom extractors firmly towards the faceplate to insert the MIRAN card into the faceplate connector and to lock it firmly in place.
- 5 Observe the faceplate hexadecimal display. It should indicate the progress of the internal self-test in the form of **T:xx** (refer to *Appendix A, MIRAN hexadecimal codes*). Upon successful completion of the test and the start-up of the RAN application, it will display the code "**Rann**", where **nn** is the LAN card number. If cards are not connected in a LAN configuration the display will show **Ra00**.

- 6 To enable the MIRAN, load the Network and PE Diagnostic program LD 32 into the system memory using the system TTY to execute the **ENLC l s c** command, where **l** is the loop, **s** is the module or shelf, and **c** is the card to be enabled.
- 7 Repeat steps 1 through 6 for each additional MIRAN.

Figure 12 shows the IPE module and the card slots used by the IPE cards. A MIRAN card can be installed into any IPE card slot except the Peripheral Controller card slot *Cont*.

Figure 12
MIRAN installed in an NT8D37 IPE module



553-6321

Connecting a terminal to the MIRAN in the IPE module

A terminal connected to the MIRAN is used for terminal-based OA&M access. It can be connected:

- to the RS-232 mini-DIN connector on the MIRAN faceplate, or
- at the MDF

Connecting the terminal to the faceplate connector

The MIRAN has an 8-pin mini-DIN connector at the bottom of the faceplate. This connector provides two RS-232 ports. These two ports are used to connect a terminal and to interconnect multiple MIRAN cards into a daisy-chain where one terminal can service all the MIRAN cards in the chain. This connection is simple and is preferred for occasional use of the terminal. For a permanent connection, use the MDF to connect the terminal to the MIRAN, as described in the next procedure (Connecting the terminal to the MDF):

To connect the terminal or a personal computer emulating a terminal to the 8-pin mini-DIN connector on the MIRAN faceplate:

- 1** Place the terminal in the desired location. If the distance to the MIRAN is less than 10 feet, you will not need an extension cable.
- 2** Select the NTAG81CA Maintenance cable and plug its 8-pin mini-DIN male connector into the MIRAN 8-pin mini-DIN female connector located at the bottom of the faceplate.
- 3** Plug the NTAG81CA cable 9-pin D-Subminiature female connector into the terminal. If the terminal requires a different connector, procure an adapter cable or a compact adapter and install it between the terminal and the NTAG81CA cable.
- 4** If the terminal is more than 10 feet away from the MIRAN, use the 16-foot NTAG81BA Maintenance Extender Cable, or use an adapter cable of the appropriate length, if the terminal requires a different connector.

Connecting the modem to the faceplate connector

To connect a modem to the 8-pin mini-DIN connector on the MIRAN faceplate:

- 1** Place the modem in the desired location.
- 2** Select the NTAG81CA Maintenance cable and plug its 8-pin mini-DIN male connector into the MIRAN 8-pin mini-DIN female connector located at the bottom of the faceplate.
- 3** Plug the NTAG81CA cable 9-pin D-subminiature female connector into the 9-pin D-subminiature male connector of the Modem cable NTAG81DA cable.
- 4** Plug the NTAG81DA cable DB-25 male connector into the DB-25 female connector on the modem.

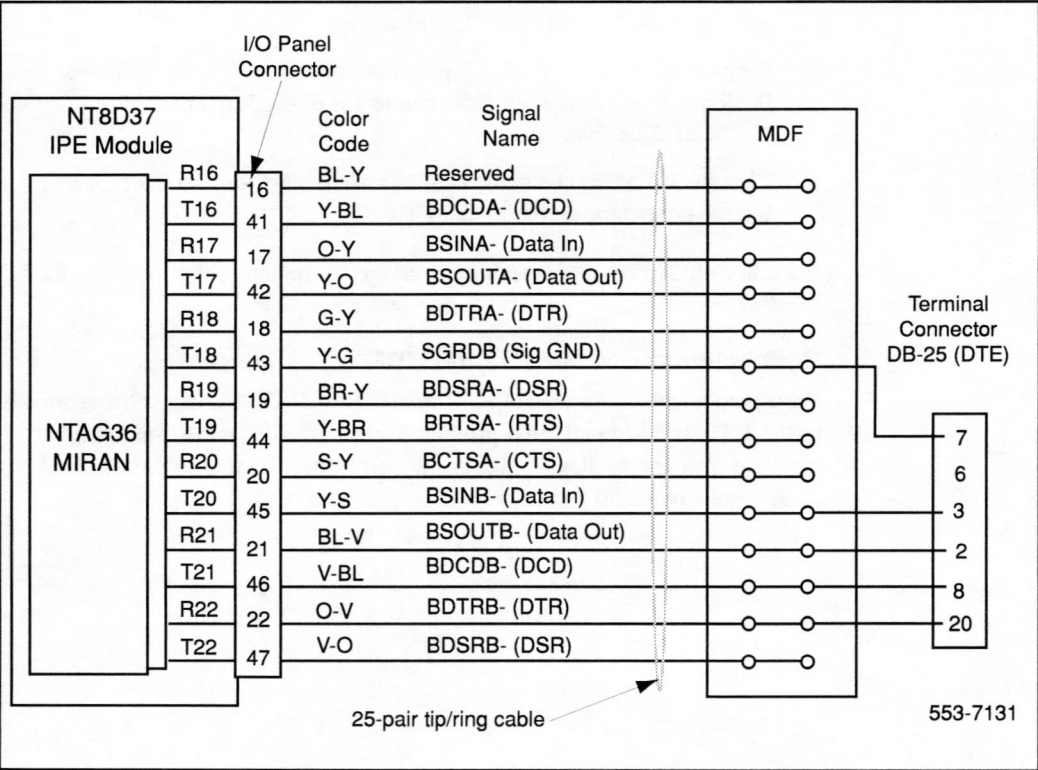
For additional information on how to setup the modem, refer to *Appendix A: Modem setup*.

Connecting the terminal to the MDF

For a permanent connection of a terminal to the MIRAN, connect the terminal to the MDF tip/ring pairs that provide the two RS-232 ports. The total distance from the MIRAN to the MDF and from the MDF to the terminal should not exceed 50 feet.

Figure 13 illustrates the terminal wiring, which starts from the IPE module backplane through the MDF to the terminal. It shows the I/O panel pinout, the 25-pair tip/ring wire color code, the signal description, the terminal cable, and DB-25 terminal connector.

Figure 13
Terminal connection to the MIRAN at the MDF



To connect the terminal or a personal computer emulating a terminal to the RS-232 ports at the MDF, refer to Figure 13 and follow the steps below:

- 1** Place the terminal in the desired location. Place it close to the MDF to minimize the total distance between the MIRAN and the terminal through the MDF. The total distance should not exceed 50 feet.
- 2** Cross-connect the terminal cable at the MDF as shown in Figure 13. Observe the cable connector pinout and the cable wire color code. Terminal cable is not supplied with the MIRAN equipment.
- 3** Punch the wires of the terminal cable open end into the MDF punch block according to the Figure 13 wiring diagram.
- 4** Plug the connector at the other end of the terminal cable into the terminal RS-232 connector.

Connecting the modem to the I/O panel connector

To connect a modem to the RS-232 port on the I/O panel connector that corresponds to the MIRAN card slot:

- 1** Place the modem in the desired location.
- 2** Plug the tip/ring 50-pin cable connector into the 50-pin I/O panel connector.
- 3** Plug the DB-25 male connector of the tip/ring cable into the modem DB-25 female connector.

For additional information on how to setup the modem, refer to *Appendix A: Modem setup*.

Connecting an external audio device

An analog audio source and receiver can be connected to the MIRAN for recording of music or messages to the Flash memory on the MIRAN and to backup messages from the MIRAN to a tape or to an other MIRAN card. It can also be used to connect an external music source (CD player or musac) directly through a trunk emulation port/channel, into Meridian 1 for MOH.

The analog sources can be connected:

- to the 3.5 mm Audio Jack on the MIRAN faceplate, or
- at the MDF

Analog to internal pass-through switchover

For Music-on-Hold, both analog channels can be used at the same time, each assigned to different internal channels.

To allow switching from an analog source to an internal channel, the configuration of each channel is polled every 30 seconds to check for an assignment switchover. If the assignment is for a voice file, the playthrough will be stopped and the voice file started immediately, and vice versa. This switchover always occurs at the end of the file to avoid hearing truncated messages.

Connecting audio devices to the MIRAN faceplate

The MIRAN has a 3.5 mm Audio Jack at the top part of the faceplate. This jack provides one audio input and one audio output.

To connect the external audio source to the MIRAN faceplate audio jack:

- 1 Plug the 3.5 mm jack on the common side of the NTAG81AA Audio Cable into the 3.5 mm Audio Jack on the MIRAN backplane.
- 2 Plug the audio input end of the NTAG81AA cable connector into the audio source device. If the source is at a distance from the MIRAN, you may have to use an extension (not supplied).
- 3 Plug the audio output end of the NTAG81AA cable connector into the audio receiver device (for message backup). If the source is at a distance from the MIRAN, you may have to use an extension (not supplied).

Connecting audio devices at the MDF

The MIRAN provides two audio inputs and two audio outputs at the MDF.

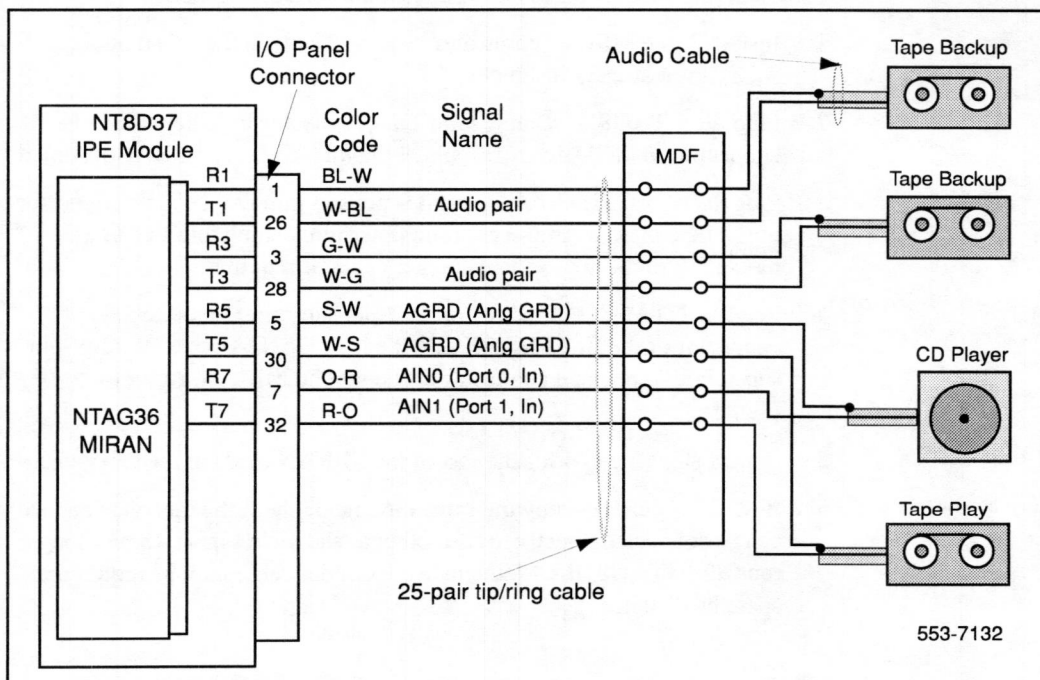
To connect the external audio devices at the MDF, refer to Figure 14 and follow the steps below:

- 1 Position the audio devices in a convenient location.
- 2 Obtain the required audio cables of the appropriate length. The cable should have open wires at one end to connect to the MDF punch block.

- 3 Connect each audio cable to the appropriate Analog GND and Port terminal on the MDF. Refer to Figure 14 for signal name and color code of the 25-pair tip/ring cable wires.
- 4 Plug the other end of each audio cable into the appropriate audio device, as shown in the figure.

Figure 14 illustrates the external audio source and backup device connections at the MDF. It shows two audio inputs that provide external music or messages to the MIRAN and two audio recorders that provide backup of messages located in the MIRAN. Analog audio sources have a separate analog ground (AGND) and analog audio backup devices have their own separate (AGND). An audio cable extends from the MDF to the audio device.

Figure 14
Analog device connection at the MDF



Connecting multiple MIRAN card

A maximum of 16 MIRAN cards can be connected in a daisy-chain to form a MIRAN Local Area Network for administration and maintenance purposes.

These MIRAN card can be inter-connected:

- at the mini-DIN connector on the MIRAN faceplate, or
- at the MDF

Connecting multiple MIRAN cards at the faceplate

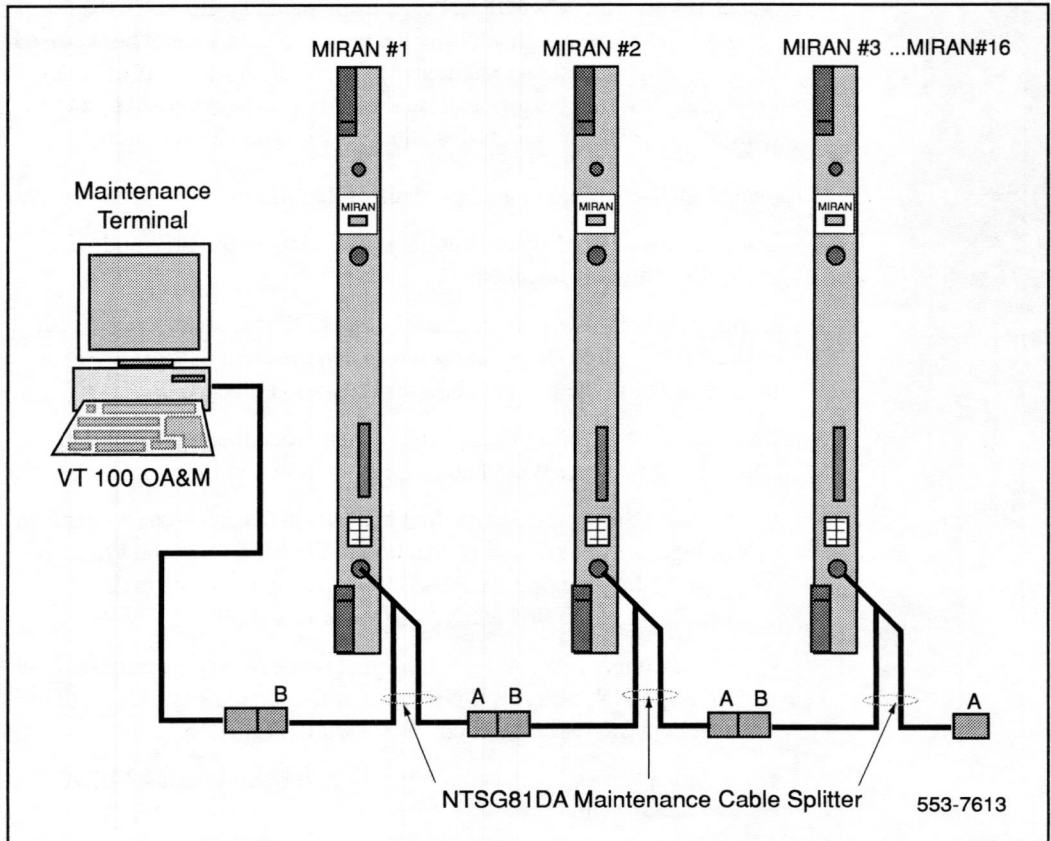
All of the MIRAN cards in the system are connected in a daisy-chain using the NTAG81DA Maintenance Cable Splitter cable with a mini-DIN connector on the common end and two 9-pin D-Sub connectors on the other ends.

To install the MIRAN cards and connect them in a daisy-chain:

- 1 Install all the MIRAN cards into their card slots in the IPE module or shelf, if not already installed.
- 2 Plug the NTAG81DA cable mini-DIN connector into the mini-DIN connector on the MIRAN faceplate. Do this for every MIRAN installed.
- 3 Plug the NTAG81DA cable Port B 9-pin sub-min D-type male connector of the first MIRAN into the terminal, terminal emulating PC, or a modem. Use the appropriate adapter cable, if required.
- 4 Plug the NTAG81DA cable Port A 9-pin sub-min D-type female connector of the first MIRAN into the NTAG81DA cable Port B 9-pin sub-min D-type male connector of the second MIRAN. Refer to Figure 15.
- 5 Repeat steps 3 and 4 for the rest of the MIRAN cards in the daisy-chain.
- 6 If MIRAN cards occupy the same module or shelf, the faceplate cables can be connected directly to each other as shown in Figure 15. For longer runs, the NTAG81BA Maintenance Extender cable may be required to span the distance.

Figure 15 illustrates the multiple MIRAN connections in a daisy-chain to enable one terminal to access each MIRAN in the chain. A maximum of 16 MIRAN cards can be daisy-chained into a LAN.

Figure 15
Terminal-based OA&M connection for multiple MIRAN cards



Connecting multiple MIRAN cards at the MDF

A maximum of 16 MIRAN cards can be connected in a daisy-chain at the MDF. This is a more convenient approach than the connection at the MIRAN faceplate because it allows MIRAN cards to be removed without disconnecting any cables.

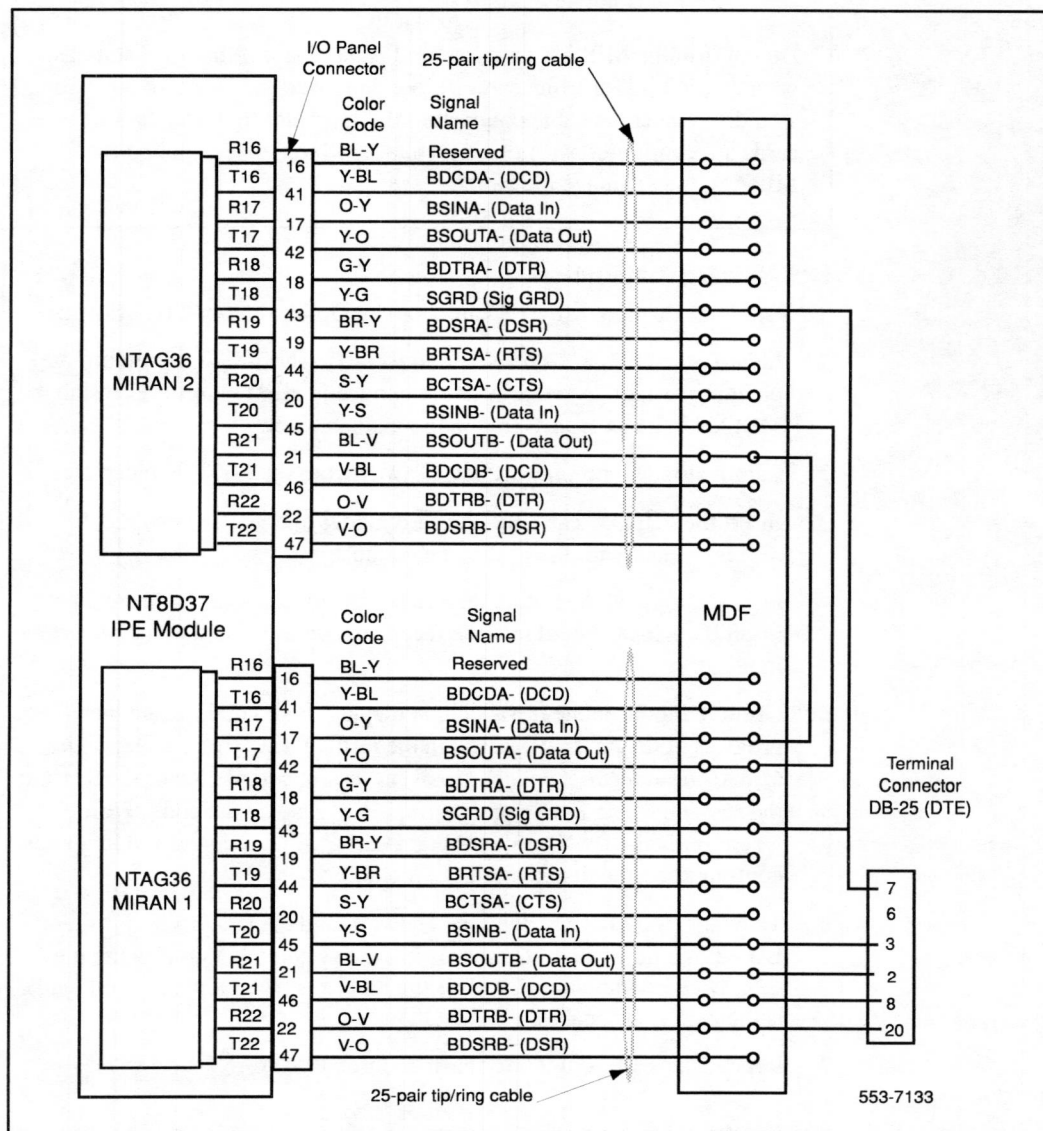
Note: If you remove a MIRAN card from the daisy-chain, all the remaining cards down-stream from the removed card, cannot be accessed by the administration and maintenance terminal. All the cards that are up-stream, towards the terminal, will continue to be accessed by the terminal. Once the card is re-installed, all cards can be accessed.

To connect MIRAN cards in a daisy-chain at the MDF:

- 1 Install all the MIRAN cards into their card slots in the IPE module or shelf, if not already installed.
- 2 Identify each 25-pair tip/ring cable at the MDF that is associated with each MIRAN card. These cables have been installed during system installation or in the pre-installation preparation phase.
- 3 Cross-connect the wires at the MDF punch block that represent the RS-232 maintenance Port A and Port B as shown in Figure 16:
 - Connect the terminal to the first MIRAN in the daisy-chain as shown in Figure 13 “Terminal connection to the MIRAN at the MDF” on page 52 by plugging the Port B 9-pin sub-min D-type male connector of the first MIRAN to the terminal cable.
 - Cross-connect Port A 9-pin sub-min D-type female connector of the first MIRAN to Port B 9-pin sub-min D-type male connector of the second MIRAN in the chain, as shown in Figure 16.
 - Continue cross-connecting Port A to Port B until the last MIRAN in the daisy-chain.
 - Port A on the last MIRAN is not connected.

Figure 16 illustrates the connection of multiple MIRAN cards over RS-232 interfaces at the MDF by cross-connecting Port A to Port B of MIRAN cards.

Figure 16
Multiple MIRAN card connections over the RS-232 port at the MDF



Option 11E/11C MIRAN installation and terminal connection

Options 11E and 11C system uses a pass-through approach to connect the TTY and the terminal used for OA&M access.

CAUTION

Do not install a MIRAN card into an IPE card slot if that card slot has been configured for a line card. Before you insert the card into the card slot, disconnect the cable connecting this card slot to the MDF. Line cards are configured with ringing voltage, which, when applied to MIRAN, may damage the card.

MIRAN card installation

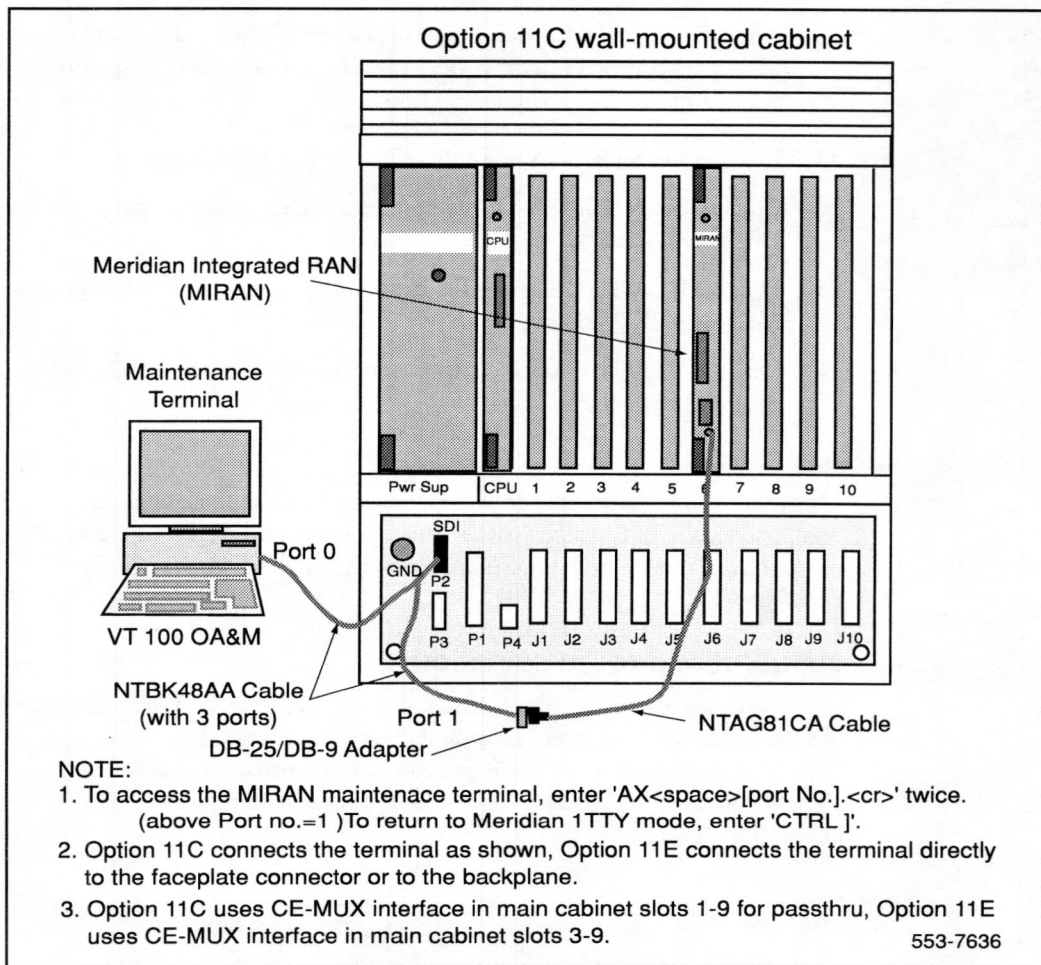
To install one or more MIRAN cards into an Option 11E or 11C system:

- 1 Identify the IPE card slots selected for MIRAN card(s). If you are planning to use CE-MUX interface connection for Option 11E, install the MIRAN in a slot from 3 to 9 in the main cabinet.
- 2 Pull the top and bottom extractors away from the MIRAN faceplate.
- 3 Insert the MIRAN card into the card guides and gently push it until it makes contact with the backplane connector.
- 4 Push the top and the bottom extractors firmly towards the faceplate to insert the MIRAN card into the faceplate connector and to lock it firmly in place.
- 5 Observe the faceplate hexadecimal display. It should indicate the progress of the internal self-test in the form of T:xx (refer to *Appendix A, MIRAN hexadecimal codes*). Upon successful completion of the test and the start-up of the RAN application, it will display the code “**Rann**”, where **nn** is the LAN card number. If cards are not connected in a LAN configuration the display will show Ra00.
- 6 To enable the MIRAN, load the Network and PE Diagnostic program LD 32 into the system memory using the system TTY to execute the **ENLC l s c** command, where **l** is the loop, **s** is the module or shelf, and **c** is the card to be enabled.
- 7 Repeat steps 1 through 6 for each additional MIRAN.

Note: During the MIRAN bootup sequence you will see either an error message or an "ok" on the hex display. To interpret an error message, refer to the hex display error codes listed in the Appendix A.

Figure 17 shows the terminal connection to the SDI port on the cabinet backplane and to the Mini-DIN RS-232 connector on the MIRAN faceplate. This allows you to use the terminal as a TTY and as a terminal-based OA&M.

Figure 17
Option 11E or 11C terminal connection



Terminal connection

A terminal connected to the Option 11E or 11C system can be used as a system TTY and the terminal-based OA&M access to the MIRAN card.

To connect the terminal:

- 1 Position the terminal on a desk near the system.
- 2 Plug the NTBK48AA cable DB-9 male connector into the SDI connector on the Option 11E or 11C backplane, refer to Figure 17 for detail connection illustration.

Note: To connect the MSDL SDI port on the Option 11E or 11C to the SDI connector, refer to the *Installation* chapter of the *Multi-purpose Serial Data Link description* (553-3001-195).

- 3 Connect the NTBK48AA Port 0 to the terminal RS-232 port.
- 4 Connect the NTBK48AA cable Port 1 DB-25 connector to the DB-25/DB-9 adapter.
- 5 Plug the NTAG81CA Mini-DIN connector into the MIRAN faceplate Mini-DIN RS-232 connector.
- 6 Plug the NTAG81CA cable DB-9 connector into the DB-9 connector on the DB-25/DB-9 adapter.

MIRAN configuration

Now that you installed the hardware, connected the terminal, connected the multi cross-connect channels to the trunk ports at the MDF, and connected the external audio devices to the MIRAN, you can proceed with the MIRAN configuration.

RAN activation and route selection

In the Meridian 1 system, the MIRAN units are configured exactly the same as the Enhanced Universal Trunk card units are configured for RAN. For detail information of overlays Trunk Route Administration (LD 16) and Trunk Administration (LD 14), refer to *X11 input/output guide* (553-3001-400).

To configure the RAN propagation route and the mode of activating the recorded announcement, you must define its parameters using Trunk Route Administration program LD 16. The MIRAN emulates the Enhanced Universal Trunk characteristics and does not require modification of LD 16 to configure the MIRAN functions.

Specifically, the MIRAN and the Enhanced Universal Trunk card, support the following modes of operation:

- Delay Dial Continuous RAN
- Immediate Start Continuous RAN
- Level Controlled Stop/start RAN

The MIRAN supports all of the above on two, four or eight totally independent ports/channels. Thus, different parts/channels of the same RAN message can be played to different callers at the same time.

Continuous RAN

Continuous (immediate or delay) RAN plays a message constantly over and over again. Callers “barge in” on a playing message if the immediate start is selected or are provided with a ringback tone until the message begins its next playing, if delay dial is selected in LD 16. At the end of each message, a pulse is issued on the control pulse line that is used by the trunk unit to cut through to the waiting call. External channels barge in at any time during the message, internal ports/channels wait until the message starts to be connected to a RAN message.

Cross-connect channels support only delay dial and immediate continuous RAN mode.

To configure the continuous mode of the RAN activation, load Route Data Block program LD 16 using the system TTY and enter the appropriate responses to the prompts as listed in Table 11.

Table 11
Defines a continuous RAN route

Prompt	Response	Description
REQ	NEW/CHG	Define new or change existing configuration
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUT	0-511	Route number
TKTP	RAN	Trunk type recorded announcement (RAN)
RTYP	CON	Continuous.
	DID	DID is selected for telephone-based OA&M access over MIRAN port 7.
REP	1-15	Number of repetitions of RAN
POST	ATT	Route to attendant after maximum repetitions
	DIS	Disconnect after maximum repetitions
STRT	IMM	Immediately connect call to recorded announcement
	DDL	Delay call connection until start of announcement
ASUP	(NO)	Do not return answer supervision
	YES	Return answer supervision
	CO	Return answer supervision if originator is a CO trunk
ACOD	xxx...x	Trunk route access code

Multi-channel level start/stop control RAN

In the multi-channel level start/stop control RAN, the leading edge of the start signal initiates message playback that continues until either the trailing edge of the start signal occurs or the end of the message is reached. A message that is terminated by the trailing edge of a level start signal is immediately reset and again made available for playback. The multi-channel level start/stop control RAN mode allows you to play the same announcement over multiple RAN channels completely independently using the same RAN route. For an example, refer to "Example 2:" on page 38.

To configure the RAN route, load LD 16 using the system TTY and respond to the prompts as shown if Table 12 with the appropriate parameter selection for your application.

Table 12
Defines a multi-channel start/stop RAN route

Prompt	Response	Description
REQ	NEW/CHG	Define new or change existing configuration
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUT	0-511	Route number
TKTP	RAN	Trunk type recorded announcement (RAN)
RTYP	MLSS	Multi-channel start/stop RAN (for X11 release 21.41 and higher and 22.16 or higher)
REP	1-15	Number of repetitions of RAN
POST	ATT DIS	Route to attendant after maximum repetitions Disconnect after maximum repetitions
STRT	IMM	Immediately connect call to recorded announcement
ASUP	NO YES CO	Do not return answer supervision Return answer supervision Return answer supervision for a CO trunk
ACOD	xxx...x	Trunk route access code

Multi-channel Start/Stop RAN (MLSS) allows you to support multiple start/stop RAN channels within the same RAN route and the individual RAN channel to each trunk route number.

Start/stop immediate RAN

In the immediate (“level”) start RAN, the leading edge of the start signal initiates message playback that continues until either the trailing edge of the start signal occurs or the end of the message is reached. A message that is terminated by the trailing edge of a level start signal is immediately reset and again made available for playback. To configure the RAN route, load LD 16 using the system TTY and respond to the prompts as shown in Table 13 with the appropriate parameter selection for your application.

Table 13
Defines an immediate start or start/stop RAN route

Prompt	Response	Description
REQ	NEW/CHG	Define new or change existing configuration
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUT	0-511	Route number
TKTP	RAN	Trunk type recorded announcement (RAN)
RTYP	LVL	Level start/stop mode.
REP	1-15	Number of repetitions of RAN
POST	ATT DIS	Route to attendant after maximum repetitions Disconnect after maximum repetitions
STRT	IMM	Immediately connect call to recorded announcement
ASUP	NO YES CO	Do not return answer supervision Return answer supervision Return answer supervision if originator is a CO trunk
ACOD	xxx...x	Trunk route access code

Music-on-hold activation and route selection

Music-on-hold (MOH) operates in a continuous mode with an immediate connection of the music source, which plays constantly. Callers “barge in” on playing music.

To specify the conference loop for the MOH, you have to access the Configuration Record program LD 17, as shown in Table 14.

Table 14
Add or change conference loop for MOH

Prompt	Response	Description
REQ	CHG	Define change existing configuration
TYPE	CFN	Configuration record
CEQU	Yes (No)	Change common equipment parameters
XCT	0-158	Loop number for NT8D17 Conference/TDS card.
CONF	0-158	Conference loop should be an even number.

To configure the RAN route, load Route Data Block program LD 16 using the system TTY and respond to the prompts as shown in Table 15 with the appropriate parameter selection for your application.

Table 15
Defines music-on-hold route

Prompt	Response	Description
REQ	NEW/CHG	Define new or change existing configuration
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUT	0-511	Route number
TKTP	COT, MUS	Trunk type 'for RAN
MUS	Yes (No)	Music-on-hold
_MRT	0-511	Music route number
STRT	IMM	Immediately connect call to music-on-hold
ICOG	OGT	For music-on-hold select outgoing trunk only
ASUP	NO YES CO	Do not return answer supervision Return answer supervision Return answer supervision if originator is a CO trunk
ACOD	xxx...x	Trunk route access code

Configuring telephone set-based OA&M access

To configure MIRAN for telephone set-based OA&M access using internal one-to-one port/channel 7, you have to configure the appropriate route and trunk data blocks. Table 16 lists Route Data Block program LD 16 commands to define the route data block for the port/channel 7 used for telephone set-based OA&M access. For a configuration example, refer to Appendix A, "DID configuration for telephone set-based OA&M access" on page 181.

Table 16
Configuring telephone set-based OA&M access route

Prompt	Response	Description
REQ	NEW/CHG	Define new or change existing configuration
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUT	0-511	Route number
TKTP	DID	Trunk type for telephone set-based OA&M access
ICOG	IAO	Incoming and outgoing trunk
NEDC	ETH	Near end. Both ends have disconnect control
FEDC	ETH	Far end. Both ends have disconnect control
ASUP	NO YES CO	Do not return answer supervision Return answer supervision Return answer supervision if originator is a CO trunk
ACOD	xxx...x	Trunk route access code

Table 17 lists Trunk Data Block program LD 14 commands that allow you to configure the trunk data block for the telephone set-based OA&M access. For a configuration example, refer to Appendix A, "DID configuration for telephone set-based OA&M access" on page 181.

Table 17
Configuring the telephone set-based OA&M trunk data block

Prompt	Response	Description
REQ	NEW	New MIRAN trunk data block
TYPE	DID	Type of trunk. Set MIRAN port 7 to DID for telephone set-based OA&M access
TN	I s c u	MIRAN loop, shelf, card slot and port. For telephone-based OA&M select MIRAN port 7
CDEN	8D	Card density of 8 ports
XTRK	EXUT	Extended trunk type for telephone set-based OA&M access
TRK	ANLG	Analog trunk
SIGL	LDR	Signaling. Loop dial repeating
CUST	0-99	Customer number defined in LD 15 and prompted when REQ= NEW
RTMB	0-127	Route number
BIMP	600, 900	Balanced trunk impedance for MIRAN
STRI	DDL, IMM	Incoming trunk starting arrangement

Configuring the MIRAN trunk characteristics

After you have configured the route, you can now configure the trunk characteristics. A trunk data block specifies the parameters for a particular trunk. Since the MIRAN is emulating the Enhanced Universal Trunk card, you can define the MIRAN parameters using the Trunk Administration program LD 14 on the system TTY and respond to the prompts as shown in Table 18 to configure the MIRAN data block.

Table 18
Configuring the MIRAN trunk data block for RAN and MOH

Prompt	Response	Description
REQ	NEW	New MIRAN trunk data block
TYPE	MUS, RAN, DID	Type of trunk; music or RAN Set MIRAN port 7 to DID for telephone OA&M
TN	I s c u	MIRAN loop, shelf, card slot and port. For telephone-based OA&M select MIRAN port 7
CDEN	8D	Card density of 8 ports
XTRK	EXUT	Type of trunk Enhanced Universal or E&M
SIGL	LDR	Signaling for battery or loop outpulsing for telephone-based OA&M over MIRAN port 7
CUST	0-99	Customer number defined in LD 15 and prompted when REQ= NEW
RTMB	0-127	Route number
BIMP	600, 900	Balanced trunk impedance for MIRAN
STRI	DDL, IMM	Incoming trunk starting arrangement
CFLP	0-159	Music conference loop

Configuring Option 11C pass-through mode

To be able to use the MIRAN maintenance terminal as a system TTY in Options 11C, you must configure the terminal parameters using the Configuration Record program LD 17 as shown in Table 19:

Table 19
Option 11C pass-through configuration

Prompt	Response	Description
ADAN	NEW TTY 1	Add system terminal TTY 1
TTY_TYPE	LSL	Terminal type
CAB	0	Cabinet number
CARD	0	SDI card position (Note)
PORT	1 (or 2)	SDI port selected (Note)
DES	MIRAN	Card name (Meridian Integrated RAN)
FLOWTYPE	NONE	Interface flow control
BPS	9600	Interface transmission speed
BITL	8	Word length - 8 bits
STOP	1	Stop bit
PARY	NONE	Parity
Note: To connect an MSDL SDI port to the Option 11E/11C SDI connector, refer to the <i>Installation</i> chapter of the <i>Multi-purpose Serial Data Link description</i> (553-3001-195)		

To access the MIRAN, type the prompt 'AX<space>[port number]'. Press Enter twice to display the MIRAN OA&M screen on the maintenance terminal.

To return to the system TTY mode, type <CTRL>] and the control will be passed back to the Meridian 1 system.

Configuring Option 11C for CEMUX access

To be able to use the MIRAN maintenance terminal as a system TTY in Options 11C over the CEMUX, you must configure the terminal parameters using the Configuration Record program LD 17 as shown in Table 20.

Table 20
Option 11C CEMUX access configuration

Prompt	Response	Description
REQ	CHA	Change data
TYPE	CFN	Configuration record
ADAN	NEW TTY 3	Add new TTY
TTY_TYPE	LSL	Low speed AUX link
CAB	0	Main cabinet
CNDO	03	Card slot
PORT	0	MIRAN port
DES	MIRAN	Port or link designation
FLOWTYPE	NONE	Flow control
BPS	9600	TTY speed
BITL	8	Number of bits
STOP	1	Stop bit
PARITY	NONE	Parity bit
ENL		Enable MIRAN
<p>To access MIRAN, at the prompt type; >ax y, where y is the TTY number. Example, >ax 3. To exit MIRAN, press the Ctrl +].</p>		

Configuring the terminal for terminal-based OA&M access

For a terminal-based OA&M access, you have to specify the VT-100 type terminal interface characteristics to ensure compatibility with the MIRAN RS-232 interface.

Set the interface parameters as follows:

- Transmission speed; 9600 bps
- Data bits: 8
- Stop bit: 1
- Parity: No
- Flow control: none

To administer RAN applications using the terminal, go to “RAN Application: Terminal-based OA&M” chapter in this manual.

If using a WindowTM based terminal emulator, you should disable the CTRL and the arrow keys by WindowsTM because these keys are used by the OA&M for traversing the menus.

MIRAN administration

As part of the administration tasks, you may have to upgrade RAN applications and perform backups. The upgrades can be:

- storage capacity expansion
- channel capacity expansion

RAN application security

There are several levels of access to the MIRAN card for the RAN application. This is to ensure the security of all announcements recorded.

The password protection for telephone set-based OA&M will be transparent to the system in which the MIRAN card is installed. In order to provide security, two levels of passwords are used. The distributor and the user levels.

The distributor level password can be alphanumeric of up to 16 characters long. The user password must be only numeric and up to 16 digits long.

Distributor level password

The distributor default password is “4321”. The distributor is able to access the base code self-test and diagnostic procedures. Also, this password level provides message monitoring for Card-LAN, DS-30X, and CE-MUX, 8051 signals.

User password

The user default password is “4321”. The general OA&M password allows a user to login to the MIRAN administration menu, check the status of the card and display the recorded announcements in service and in reserve. The first level of access will in addition allow the user to swap announcements in and out of service. The second level of access will in addition again allow the user to record and configure recorded announcements.

Software security

To provide security for the RAN and music applications as well as to prevent unlawful product usage, the MIRAN uses the security device and keycode security approach.

Security overview

A security device and keycode mechanisms are needed to protect against unlawful MIRAN feature usage. All upgrades of either port capacity or application software are restricted to a given MIRAN card and are accurately tracked to allow for satisfactory handling of field repairs and incremental upgrades.

A new keycode is required for the following upgrades:

- port capacity upgrades; two are possible:
 - from one multi-cross connect channel to two
 - from four one-to-one ports/channels to eight
- feature enhancements
- new applications

Security is not required for the following upgrades:

- Voice and music storage capacity expansion
- customer recorded announcements

- backup and restore operations
- application patching/bug fix

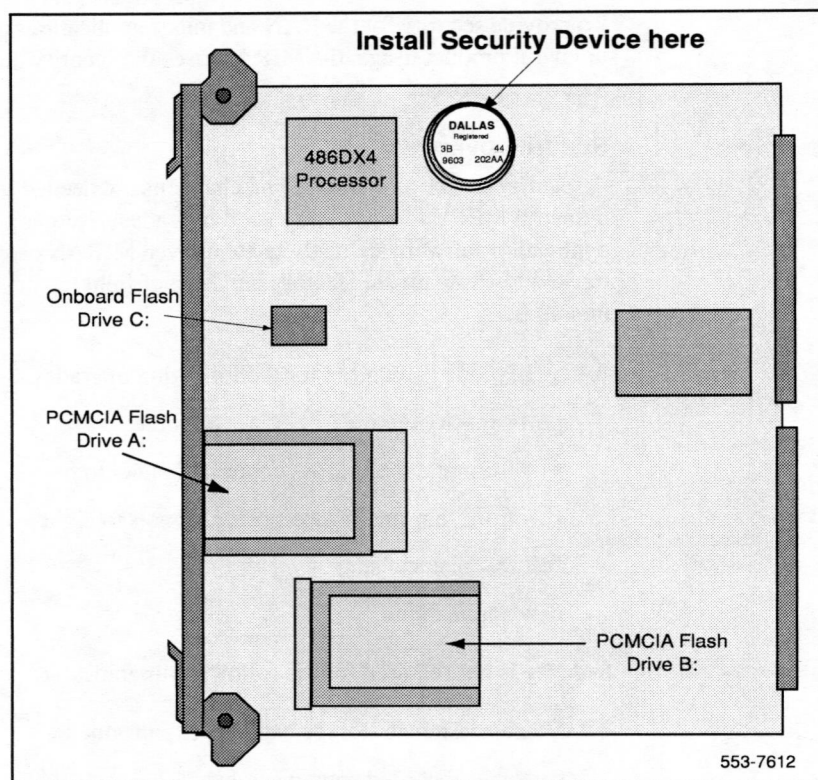
Security device

This button-sized device has a unique 8-digit security ID that cannot be overwritten. In addition, it contains 1kbit of PROM to:

- identify the button as part of a Nortel product
- act as a store for any upgrades previously performed on the MIRAN card

Figure 18 shows the position of the security device and the on-board PCMCIA Flash card.

Figure 18
Security device installation location



Security ID

The security ID is an 8-digit number used to uniquely identify the MIRAN card. It is stored on the PROM on the card.

The security ID can be found:

- at the top left-hand corner of the terminal-based OA&M menu or screen
- by using a command on the telephone set-based OA&M access

To upgrade a MIRAN, the customer provides Nortel with the security ID of the original card and Nortel provides the customer with a matching keycode.

Keycode

Nortel provides the customer with a keycode to enable them to install any purchased upgrades. The keycode is entered over the local maintenance port on the MIRAN card. The code consists of a stream of 24 digits that matches the Security ID of the MIRAN being upgraded.

When the MIRAN is ordered with a new Meridian 1 (Options 51C through 81C), the keycode is pre-loaded by the factory into the MIRAN. Option 11E or 11C and stand-alone orders of the MIRAN, require that you enter the keycode using a VT100 type terminal.

Keycodes can enable additional functionality within an existing application (adding ports, features, etc.) or can be used with a PCMCIA Flash card to provide new software or pre-recorded announcements.

The keycode must contain the security device information to be compatible with the specific MIRAN to enable the upgrade. If there is a mismatch, the upgrade cannot be activated.

RAN installation

Various recorded announcements are recorded and assigned to the required RAN one-to-one ports/channels over the RAN OA&M application. One announcement may be assigned to several ports to let the MIRAN card know which announcement is to be played when a particular MIRAN port is seized. To play the same announcement over several trunks on the same route, you must use multi-channel level start/stop control RAN mode.

The different ports/channels on the card are configured as either immediate start or delay start to allow the MIRAN card to match system configuration options to each trunk port. Finally, corresponding routes and Enhanced Universal Trunk cards or Flexible E&M cards are defined on a system level. Refer to “MIRAN configuration” on page 62 in this chapter.

If the same recorded announcement is required on more than one MIRAN card, then it must be installed separately on each card by backing up to PCMCIA Flash on one card and restoring on the remaining cards.

Real time clock setup

The MIRAN real time clock is set up using the MIRAN administration menu (refer to “RAN Application: Terminal-based OA&M” on page 107). The craft person should set the clock to match the system clock. This should be done before starting RAN configuration.

The MIRAN clock has battery backup in case of power reset. In addition, the clock is used to timestamp entries in various log files on the card, and to switch between “day-time” and “night-time” announcements.

Telephone set-based OA&M

If the telephone set-based administration is needed, then you must configure the MIRAN port/channel 7 for this purpose. Because the telephone set-based OA&M port/channel 7 is originally available for general RAN functions, you must define it as a DID trunk port. A all numeric password is required to use the telephone set-based OA&M access. Port/channel 7 is also available for telephone set-based OA&M access in small and medium size MIRAN cards.

Note: Make sure that the keycode has been loaded into the MIRAN using a VT100 type terminal (if not already loaded in the factory), before you attempt to use telephone set-based OA&M access.

First define the port on the card as a DID trunk, then define the corresponding route and the access code at the system level. This port is then restricted to telephone set-based OA&M and cannot be used to play recorded announcements or music. For configuration details, refer to “Configuring telephone set-based OA&M access” on page 69 and configuration example in Appendix A, “DID configuration for telephone set-based OA&M access” on page 181.

Access the OA&M application by dialing the DID trunk access code and entering the password. After the password is entered, the voice menu becomes available. Refer to Table 16 for LD 16 prompts and Table 17 for LD 14 prompts.

Terminal-based OA&M

The MIRAN terminal-based or text-based interface is provided for the RAN OA&M over the direct connection to a terminal or PC. It is also available indirectly, using the STA (Single Terminal Access) feature on the Multi-purpose Serial Data Link (MSDL) card. Refer to “RAN Application: Terminal-based OA&M” on page 107.

MIRAN card administration

The following tasks may be performed by the RAN application, using the RAN administration menu on the MIRAN card using terminal-based OA&M access:

- Recording announcements.
- Changing recorded announcements between different MIRAN ports/channels.
- Swapping recorded announcements between “in service” and “in reserve”.
- Adding additional memory resources.
- Upgrading MIRAN applications using PCMCIA card.

The following MIRAN tasks are **not** available over the telephone set-based OA&M; due to their complexity; they are **only** available over a terminal-based OA&M:

- Uploading recorded announcements/music over the analog port on the MIRAN card faceplate.
- Uploading recorded announcements/music using a PCMCIA card.
- Connecting an analog source (e.g. CD player for music-on-hold) through the analog port on the faceplate.
- Cannot enter a keycode.
- Checking usage of the memory resource.

- Backing up MIRAN applications and/or announcements.
- Restoring MIRAN applications and/or announcements.
- Accessing various information files (e.g., security file, operational measurements file, etc.)
- Setting the MIRAN card clock.
- Assigning time-of-day based messages.

MIRAN administration using a terminal

Use a VT-100 type terminal or a PC terminal emulator program under Windows to perform an OA&M session.

If multiple MIRAN cards are used in a single system, an OA&M terminal attached to one card can gain pass-through access to any other MIRAN card that is daisy-chained to the first (refer to Figure 15). Access a MIRAN card connected to the VLAN from the maintenance terminal.

For using the terminal-based OA&M access, refer to “RAN Application: Terminal-based OA&M” on page 107.

Telephone set-based MMI

After port/channel 7 on the MIRAN card is configured for the telephone set-based maintenance and the keycode has been loaded, then it is possible for the customer to access this channel from any telephone set and record any announcements required. This is done in the same manner as recording a personal greeting for Meridian Mail, for example.

To use a telephone set-based OA&M access, the following steps are required:

- 1 Assign channel 7 for telephone set-based OA&M access, refer to “OA&M Access Configuration” on page 142.
- 2 Record announcements using the telephone set, refer to “Telephone set-based OA&M flowcharts” on page 99.
- 3 Assigning recorded announcements to specific channels, time-of-day, and day-of-the-week; refer to “Assign Message” on page 118.

Note: If you assign a channel using the telephone set, all previous recording configurations for that channel are overwritten and replaced by the recording assigned through the telephone set.

For using the telephone set, refer to the section titled "RAN Application: Telephone set-based OA&M" on page 91.

Recording announcements and music

There are three different voice recording methods available to MIRAN customers:

- Access port/channel 7 (the maintenance port) over a DTMF telephone, and use the voice menu provided to record announcements that you speak into the telephone
- Use a PC with terminal emulation program and record to the PC over an RS-232 port
- Cable your portable tape or CD player directly into an audio port on the faceplate or MDF to record directly into the MIRAN.

Music can be recorded in the same manner as actual announcements. The MIRAN can hold several minutes of music in Flash EPROM for use by features such as music-on-hold. Generally the music is downloaded to the MIRAN from an external analog source such as a tape recorder or a CD player. The music source is connected to the analog port of the MIRAN card. Connections are available on both the faceplate and the MDF.

PC-based recording

This is professional recording that can be provided to the user. An example of the system requirements to perform the recording and editing are:

- WindowsTM environment
- Creative Labs AWE 32 Plug and Play audio card ModelCT3601, or equivalent
- PCMCIA Drive: DATABOOK ThinCard Drive Model TMB-240, or equivalent
- Software: GOLDWAVE sound editor, or equivalent

To perform the pc-based recording use one of the following methods:

- Use ".WAV" output of PC sound editor such as SoundBlasterTM or equivalent

- Convert from .WAV to raw A-law or U-law PCM (.ALW or .ULW file extensions should be used) using the sound editor
- Download to the MIRAN using PCMCIA
- Use the MIRAN utility to convert from .WAV to raw A-law or U-law PCM where the sound editor does not support this conversion feature

Note: When recording announcements, use the following recommendations. To remove sharp transitions at the boundaries of an announcement, add fade-in (from 0) at the start of the message and fade-out (to 0) at the end of message. Also, one second of silence must be added to the beginning and to the end of each message or clicking noise can be heard by the user.

The MIRAN professional recordings are first made on a third party PC sound editor that produces WAV files (.WAV is the Windows™ sound file standard). The best known of these editors is SoundBlaster™ Stereo Pro (16 bit sampling), comes with professional studio software for the manipulation of sound files subsequent to recording.

A specific sound editor is not recommended or supported by Northern Telecom. However, the format of the output file should be .WAV. Thus the choice of recording product will be at the discretion of the local distributor or end user.

After the files are edited in the PC, they can be downloaded to a PCMCIA card on the MIRAN in .WAV format. The PCMCIA card can then be inserted into the MIRAN.

You can use the Convert Message Files menu to convert the .WAV files into the .ALW or .ULW raw PCM files or vice versa, where .ALW corresponds to A-law and .ULW to U-law format.

Tape recorder and CD player recording

The .ALW or .ULW files are generated over the cross-connect channels using a recorder or a CD player. The recording supported is 8-bit PCM A-law or Mu-law mono sound.

Telephone set-based recording

The files are generated over the telephone set-based OA&M access are saved in .ALW or .ULW format based on the current system's coding/decoding law.

If you record a new message, it will be stored on the first available disk starting with B:, then A:, and finally C:.

If the message is stored on drive A: or B:, the message will be deleted unless you save it. If the message is stored on drive C: it is placed in RAM. If you save the message, the message is recorded in Flash on drive C:. Message saving is a slow process (takes about as long as it takes to record it).

CAUTION

When writing to the drive C:, MIRAN ports/channels should be idle except for channel 7, which is used for telephone set-based OA&M access. If message playing is allowed at this time, the messages playback quality may be poor, or the MIRAN card may re-boot.

Music sources

Music can be accessed by two methods, both externally and internally. Both of these methods may be used at the same time.

External music

In the case of external music, there is a permanent connection between an external music source (e.g. CD player, tape recorder etc.) and the MIRAN over the analog input port. This port is available both at the MDF and also on the MIRAN faceplate. External music is the most suitable implementation in cases where there is a requirement to frequently change the music.

The analog input is obviously not confined to music and can be used in many applications e.g. a “talking timetable”, or perhaps advertisements, which are changed on a regular basis. This type of implementation would generally be found on the larger system options where it is acceptable to have a dedicated piece of audio equipment for this purpose.

Internal music

Internal music is normally used in situations where it is not possible or desirable to have a music source permanently connected to the MIRAN. In this situation, a craftsperson uses an external music source to record the music onto the MIRAN, where it is stored digitally in Flash memory.

If more than 4 minutes of storage is required, a PCMCIA card is required.

Card-level administration

The card-level administration is used to re-record or re-assign messages to channels based on traffic statistics. Refer to “RAN Application: Terminal-based OA&M” on page 107.

Altering an assigned message: option 1

Disable any units to which the message is assigned, unassign the message, delete the message, and record a new message that can be re-assigned.

Replace and old message: option 2

Record and swap a new message between active calls to avoid disturbing service; then, delete the old message. This method assumes sufficient free storage to allow recording the new message without deleting the old one.

Command files

The MIRAN can accept downloaded command files that are similar to DOS batch files. Command files are used to store configuration information during backup and restore operations. The PCMCIA Flash card stores command files along with voice files. Entered on the terminal or downloaded, backup information can be edited on a PC capable of reading ATA-compatible PCMCIA cards. Refer to *Command summary* menu in “RAN Application: Terminal-based OA&M” on page 107.

Utilities that can edit messages are simple text files, such as DOS EDIT or Windows Notepad, can also edit command files. It is not necessary to type configurations individually into each MIRAN, because customer configurations can be generated on a PC and copied to multiple MIRAN cards on the same RAN route.

RAN upgrades

Several types of RAN application upgrades are available on the MIRAN card. These are:

- a software upgrade for bug fix and/or addition of new features
- a memory upgrade to increase the voice storage capacity
- a memory upgrade to add new pre-recorded announcements / music
- a mixture of the above

To perform and RAN upgrade:

- 1 Insert a PCMCIA card into the A: slot on the MIRAN faceplate.
 - If the new PCMCIA card contains a configuration file, the MIRAN executes this file to perform the upgrade automatically. This configuration file can be prepared in the distributor's office for each MIRAN customer and then placed on the PCMCIA card along with the application and/or recorded announcements to be upgraded. Then, the PCMCIA card is sent to the customer, who only has to insert the PCMCIA card in the MIRAN card to perform the upgrade.
 - If the new PCMCIA card contains a feature upgrade but no configuration file, the MIRAN card can perform the upgrade without any intervention by the craftsperson.
 - After the feature upgrade configuration is completed, enter the new keycode on the MIRAN terminal to activate new features you just installed.
 - For the new feature to become active, you must perform a hard reset.
- 2 If the PCMCIA card contains .WAV sound files but no configuration file, you have to establish a administration session, as described in this step, in order to perform the upgrade and configuration of file assignments.

To replace old announcement files with new files on the PCMCIA:

- Display existing (old) files using the List Files menu "List Files" on page 133.
- Delete the files you wish to replace with new files on the PCMCIA card, by using the "Delete File" on page 136.
- Copy new files from PCMCIA card into the drive where your other announcement files are located, by using the "Copy File" on page 135.
- Convert files from .WAV to .ULW or .ALW or vice versa, if required, by using the "Convert Message File" on page 124.
- Professionally recorded prompts must be in .WAV, .ALW, or .ULW format. For recording announcement files, refer to *Appendix A, Sound recording configuration*.

- 3 To configure the announcement file assignment, you have to assign the day/time and channel when and where this file will be played. To do this, use the “Assign Message” on page 118.
- 4 If a PCMCIA card contains both a feature and recorded announcement upgrade but has no configuration file, the MIRAN circuit card performs the feature upgrade automatically.
 - Perform the recorded announcement upgrade as in step 3 of this procedure.
 - After the configuration is completed, enter the new keycode on the MIRAN terminal to activate new features you just installed.
 - For the new feature to become active, you must perform a hard reset.

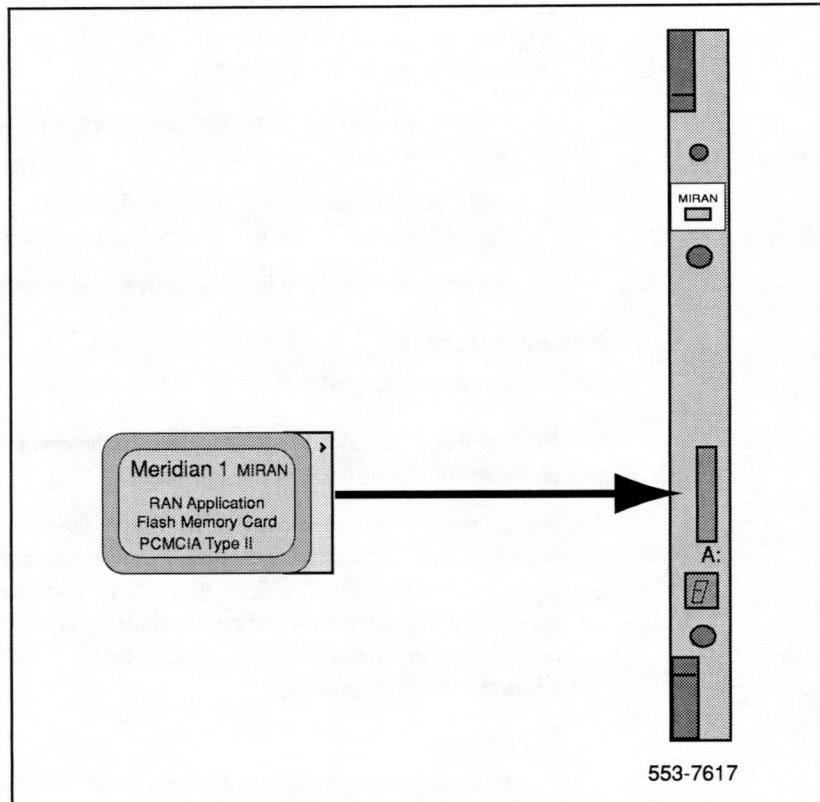
Software upgrade

Perform a software upgrade:

- 1 Insert the new feature PCMCIA card into the drive A: slot on MIRAN, as shown in Figure 19.
- 2 Initiate the upgrade by using the “Software Upgrade” on page 140. The MIRAN copies across the new application while maintaining all files from the existing ATA Flash memory that are still needed (i.e. existing recorded announcements and configuration). Once the upgrade is complete, remove the old Flash card, unless it is needed to provide additional storage capacity.
- 3 Keycode requirement:
 - If the software upgrade is a maintenance type (bug fix etc.), new keycode is not needed.
 - If the upgrade consists of a new application or enhancement, the administrator must enter a new keycode on the maintenance terminal to enable the upgrade.
 - For the new feature to become active, you must perform a hard reset.

Figure 19 shows the MIRAN faceplate and the PCIMCIA card slot.

Figure 19
MIRAN software upgrade



Increasing voice storage

You can increase voice storage capacity to the maximum amount available on commercially available PCMCIA memory cards (up to 5 hours).

To expand the message storage capacity, insert a blank PCMCIA Flash card into the A: slot on the faceplate. The MIRAN software checks the Flash card for formatting information. If none exists, the MIRAN will proceed to format the card in DOS format. When completed, the full capacity of the card will be available for storage. To expand voice storage, use the on-board slot B:

Backups

Backup of recordings is not necessary because the Flash technology used on the MIRAN is very reliable. However, backup is available to a PCMCIA memory card, if needed.

The configuration must be backed up. To backup the configuration, refer to "Backup Configuration" on page 127.

PCMCIA backup

Insert a blank PCMCIA card into drive A: just as if you were increasing the voice storage capacity. Before beginning to record any additional messages to this Flash, initiate an OA&M session and select the backup to PCMCIA option or use the **BACKUP** command.

The drive A: is checked for the BACKUP.DAT file before checking drive C:. If the file exists on the PCMCIA card in drive A:, the system will retrieve the configuration from this drive rather than the BACKUP.DAT file in drive C:. For details, refer to the *RAN Application: Terminal based OA&M* and *Telephone set-based OA&M* chapters in this document. The new card is now available as a backup medium rather than as a storage medium.

If you attempt to backup to a non-blank card, the existing files will be overwritten.

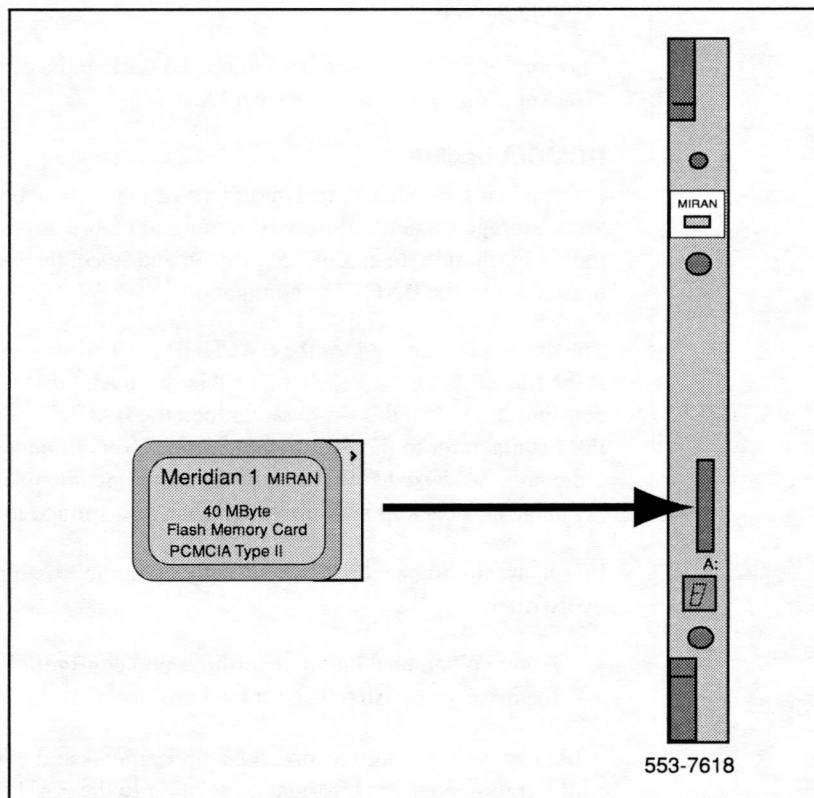
Note: When backing up recordings and configuration, you must define the drive you wish to use for backup.

A backup includes both recorded announcements and configuration. The configuration contains information relating to the RAN/music PCM data stored in Flash that includes:

- voice files
- announcement-to-channel allocation
- external/internal music selection
- passwords
- RS-232 port settings

Figure 20 illustrates backing up recordings by using a Flash Memory card.

Figure 20
Backup of MIRAN configuration/recordings



Restoring configuration

When you re-boot MIRAN, the MIRAN configuration is restored from the disk using the following sequence; first drive A: then drive B: and finally drive C:. This allows a previously stored configuration to be over-written by installing an ATA card in drive A:, which contains a new BACKUP.DAT file that has been saved on a different MIRAN card.

RAN Application: Telephone set-based OA&M

This chapter describes the telephone set-based OA&M access to the RAN applications.

General steps in configuring and using the telephone set

To use a telephone set-based OA&M access, the following steps are required:

- 1 Configure port/channel 7 as the DID trunk for the telephone set-based OA&M access. Refer to “Configuring telephone set-based OA&M access” on page 69.
- 2 Assign channel 7 for telephone set-based OA&M access, if not already assigned, refer to “OA&M Access Configuration” on page 142.
- 3 Go off-hook and dial the access code.
- 4 Enter the password (must be all numeric). Go to Password Entry flowchart in “Password Entry” on page 100. The Main Menu becomes accessible to the user.
- 5 From the Main Menu, dial the appropriate command to execute a specific function. Refer to “Main Menu” on page 100.

From the Main Menu you can activate the following functions:

- Dial **1** to setup messages. Refer to “Setup Menu” on page 106.
- Dial **2** to play the current message.
- Dial **4** to move to the previous menu.

- Dial **5** to record a message. Refer to “Record Menu - part 1” on page 100.
 - Dial **6** to move to the next message.
 - Dial **8** to query the MIRAN security ID.
 - Dial **76** to delete a message. Refer to “Delete Menu” on page 105.
- 6** Assign announcements (recorded using the telephone set) to specific channels, time-of-day, and day-of-the-week using the terminal, refer to “Assign Message” on page 118.

Note: To assign a message using the telephone set-based OA&M access command, you remove all previous assignments for the channel selected, which may not be what you want. By using the terminal-based OA&M access menu “Assign Message” on page 118, you can assign specific messages to specific channels without deleting all previous assignments for that channel.

Telephone set-based interface

Note: Before you can login and access the MIRAN, you must **be sure that the keycode has been loaded into the MIRAN**. Otherwise, you will not be able to access the MIRAN. The keycode is installed into the MIRAN at the factory when ordered with a new Meridian 1 (Options 51C through 81C). For Option 11 and merchandize orders of the MIRAN, the keycode is not loaded and must be entered using a VT100 type terminal.

A telephone set-based interface within the RAN application allows you to access the application from any telephone set, either internally or externally, to record new announcements or to swap existing announcements in and out of service. It is intended for use in small system configurations where the MIRAN card is used for basic RAN applications. The telephone set-based OA&M is useful for quick modification of announcements but not suitable for extensive or complex modifications; extensive changes are better handled by the terminal-based OA&M interface.

The operations performed in this mode are limited to:

- record new messages or announcements
- play messages

- assign messages to one-to-one internal ports and two cross-connect ports
- access the card's security ID

It is not possible to access the telephone set-based OA&M while the terminal-based OA&M is logged in.

One of the eight one-to-one ports (port 7) on the MIRAN card must be dedicated to support the telephone set-based OA&M access. The reserved port is configured as a DID trunk on the Meridian 1 system to make it accessible over its route access code. The telephone set-based OA&M reduces the number of MIRAN ports available for RAN or music from eight to seven. Because there is no messaging between MIRAN cards, one port must be reserved for the telephone set-based OA&M on each MIRAN card that requires this interface. If the telephone set-based OA&M is not required, then all eight ports on the MIRAN card are available for RAN or music.

The telephone set-based OA&M access may be invoked locally on the system or remotely external to the system. Security for telephone set-based OA&M is ensured via a MIRAN-provided password. The MIRAN card will not identify itself until a valid password has been entered. Overwriting/deleting files, accessing system configuration functions, and changing passwords are not possible in the telephone set-based mode.

The user interface for the telephone set-based OA&M access uses a series of simple voice menus and prompts to guide the user through the configuration process. All prompts are in N.A. English and are part of the existing Meridian Mail prompt pool.

The tone interface for the telephone set-based OA&M access is based on that for Meridian Mail, for example, press "76" to delete an announcement. All feedback to the user is also by using tones, e.g. overflow tone for error conditions.

Restrictions on telephone set-based OA&M access

Toll calls to the telephone set-based OA&M channel can be disconnected if the NATL prompt in LD 16 is set to YES. Dialing a 0 or a 1 as the first digit is not allowed and the call is released if you specify NATL= YES. The same thing happens when the NFCR prompt is set to YES in LD 15. Both prompts should be set to NO to avoid this problem.

When you dial the password, after the password press the number sign twice (##) to make sure the system recognizes the end of the password.

Using the telephone set

To perform application tasks over the telephone set, you have to use the telephone dialpad. By pressing specific digits on the dialpad, you will be able to login and issue specific commands as described below.

Login

To login, you must dial the access code of the DID trunk configured on channel 7 of the MIRAN card. Channel 7 must be enabled using the *Access Configuration* menu in the *RAN Application: Terminal-based OA&M* chapter in this document.

The default password is “**4321**”. Enter the password with **all numeric characters** followed by two number signs (##). If after three attempts you do not enter a correct password, the system will lock you out.

Menu operation

Menu selection is made by pressing a digit on the telephone dialpad. To terminate an entry execution and to request content specific help messages:

- **Terminate an Entry** - enter # (this number sign is used to exit the menu)
- **Request for Help** - enter * (this star sign provides a help message)

Assigning a message

To assign a message file to a port so that any call routed to that specific port will hear the assigned message.

Table 21 shows internal and cross-connects MIRAN ports/channels.

Table 21
Port/channel number assignments for telephone set-based OA&M

Channel Number	Description
0	Internal one-to-one port/channel
1	Internal one-to-one port/channel
2	Internal one-to-one port/channel
3	Internal one-to-one port/channel
4	Internal one-to-one port/channel
5	Internal one-to-one port/channel
6	Internal one-to-one port/channel
7	Internal one-to-one port/channel (used for telephone set-based OA&M access, if required).
8	Cross-connect channel (also A0 for terminal-based OA&M access configuration)
9	Cross-connect channel (also A1 for terminal-based OA&M access configuration)

*Port/channel 7 is configured for the terminal-based OA&M access.

- **Setup** - enter **1** (it activates the assign command)
- **Enter port number** - enter the port number from the table above

Message selection

When you login, the first message within the available disk volumes is automatically selected. This message can be assigned, played, or deleted. To select a message:

- **Next Message** - enter **6** (to go to the next message in the sequence)
- **Previous Message** - enter **4** (to return to the previous message)

When you go back to the start of the message list, the announcement will be "Message one".

Playing a message

To play the currently selected message file use the following command sequence:

- **Play Message** - enter **2** (plays the current message from the main menu)
- **Stop Playing** - enter **#** (to stop playing the current message)

Recording a message

To record a message use the following command sequence. When saved, recorded messages are assigned a filename of the form MSGnnnn.ALW or MSGnnnn.ULW depending on the system companding law:

- **Record Message** - enter **5** (to record a new message)
- **Stop Recording** - enter **#**
- **Save Message** - enter **1**

The message can be added to the first disk volume with available space of at least 64 kbytes or 8 seconds of recording.

If the available space is exceeded while recording, a BEEP is given along with the "Recording stopped" announcement.

Deleting a message

The current message will be unassigned and deleted.

- **Delete a Message** - enter **76** (unassigns and deletes the current message)

Playing the 8-digit security device ID

To hear the MIRAN security device ID number:

- **Security device ID** - enter **8** (will hear the eight digits that identify the security device)

Example of a message recording over an analog port

Table 22 lists the steps required to use the telephone set to activate, update, or delete messages on the MIRAN.

Table 22
A telephone set-based MMI example

Step	User action	MIRAN response	Comments
1	Go off-hook	N/a	N/a
2	Enter access code for channel 7	Voice prompts for Login; password	Dial the MIRAN admin DN (access code).
3	Enter password and then ## (all numeric)	Voice menu of options available	You may receive a "Login incorrect" message if the password is in error.
4	Press 5 to start recording	Voice menu of options available	Records one or more messages into temporary files.
5	Enter "#" to stop recording	STOP_TONE	Recording stops.
6	Enter "1" to save the message	"Message saved"	The message is saved to disk and becomes the currently selected message.
7	Place the receiver on-hook	N/a	N/a
8	Select Play Message menu using the terminal	Play messages form temporary files	If messages are acceptable, you can assign them to channels.
9	Select Assign Message menu using the terminal	Assign the message to the channel, time and day	This assigns each message recorded using telephone set-based OA&M access to the appropriate channel.

Voice prompts

Table 23 lists voice prompts file names, prompt detail, and its duration.

Table 23
OA&M voice segment files, their content, and duration (Part 1 of 2)

Filename	Prompt content	Duration
_seg0242.sbc	Sorry, that command cannot be used at this point.	2.72sec
_seg0247.sbc	There is nothing to play.	1.24sec
_seg0248.sbc	silence	0.44sec
_seg0262.sbc	Good-by	0.8sec
_seg0323.sbc	zero	0.83sec
_seg0324.sbc	one	0.76sec
_seg0325.sbc	two	0.67sec
_seg0326.sbc	three	0.8sec
_seg0327.sbc	four	0.8sec
_seg0328.sbc	five	0.92sec
_seg0329.sbc	six	0.89sec
_seg0330.sbc	seven	0.83sec
_seg0331.sbc	eight	0.67sec
_seg0332.sbc	nine	0.83sec
_seg0369.sbc	Please try again.	1.56sec
_seg0391.sbc	To exit, press number sign (#).	2.27sec
_seg0404.sbc	To begin recording, press 5. To end recording, press number sign (#).	4.57sec
_seg0410.sbc	For help, press star (*).	2.14sec
_seg0518.sbc	Please enter your password, followed by number sing (#).	2.72sec

Table 23
OA&M voice segment files, their content, and duration (Part 2 of 2)

Filename	Prompt content	Duration
_seg0523.sbc	Deleted.	0.6sec
_seg0562.sbc	End of list.	0.89sec
_seg0643.sbc	To go to the next message, press 6. To go to the previous message, press 4.	4.96sec
_seg1237.sbc	Message saved as message.	2.11sec
_seg2003.sbc	To re-record the prompt, press 5. to review it, press 2.	4.25sec
_seg2220.sbc	Assistance is not available.	1.6sec
_seg2291.sbc	Main menu.	0.92sec
_seg2342.sbc	Login incorrect.	1.53sec
_seg2451.sbc	To save the message as new, press one.	2.52sec
_seg2528.sbc	Enter a list of addresses followed by number sign (#). End the list by an additional number sign (##).	6.04sec

Telephone set-based OA&M flowcharts

Refer to the telephone set-based flowcharts on the pages indicated to view the following telephone set-based functions:

- Password Entry flowchart
- Main Menu flowchart
- Record menu flowchart
- Delete menu flowchart
- Setup menu flowchart

Password Entry

Dial in the access code to access MIRAN.

Main Menu

Record Menu - part 1

Dial 5 in the Main Menu to access the Recording Menu. This function allows you to make recordings, which are later assigned using the Setup menu. The Setup menu is accessed from the Main Menu by dialing 1.

Figure 21
Password entry flowchart

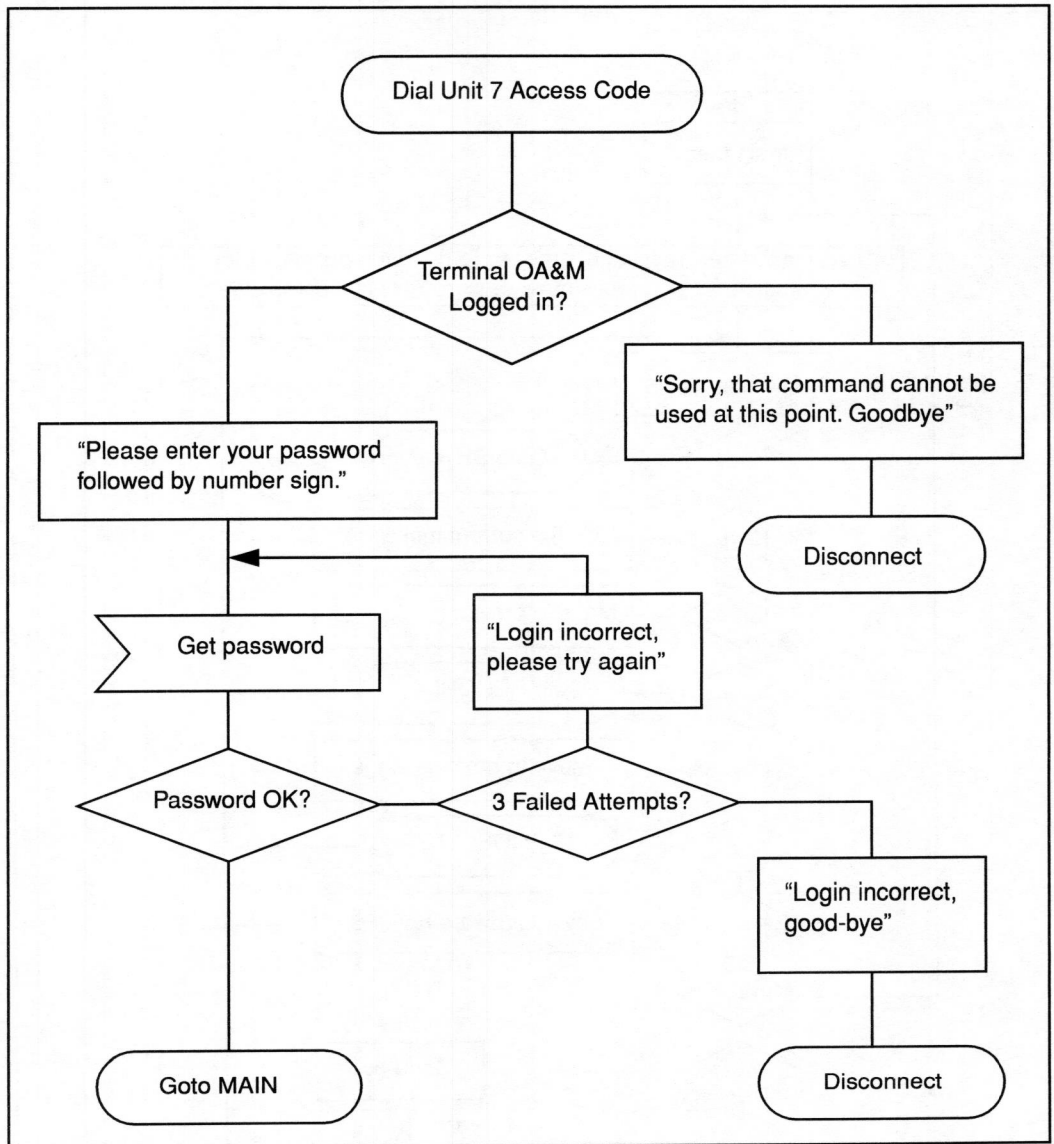


Figure 22
Main Menu flowchart

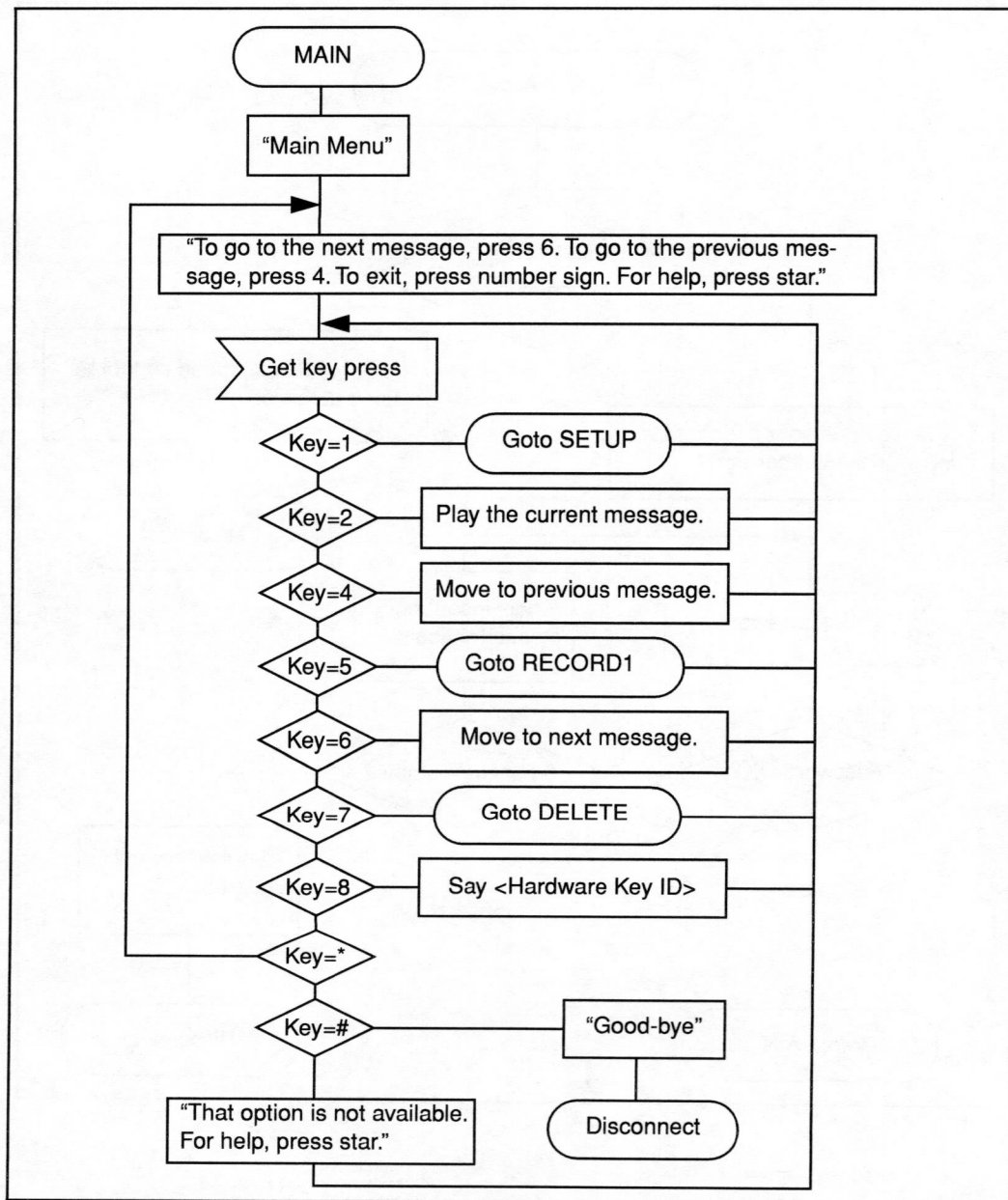
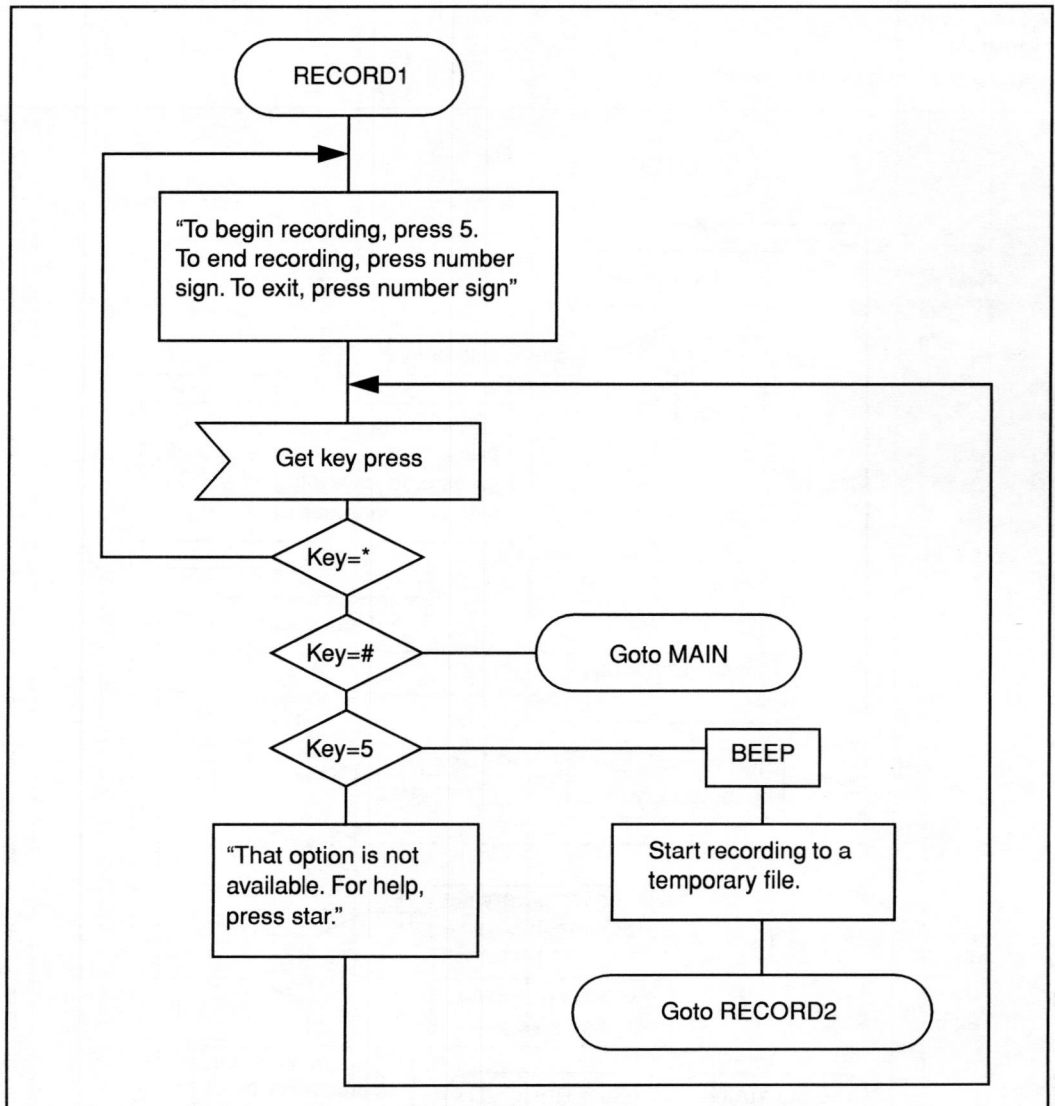


Figure 23
Record menu flowchart, part 1

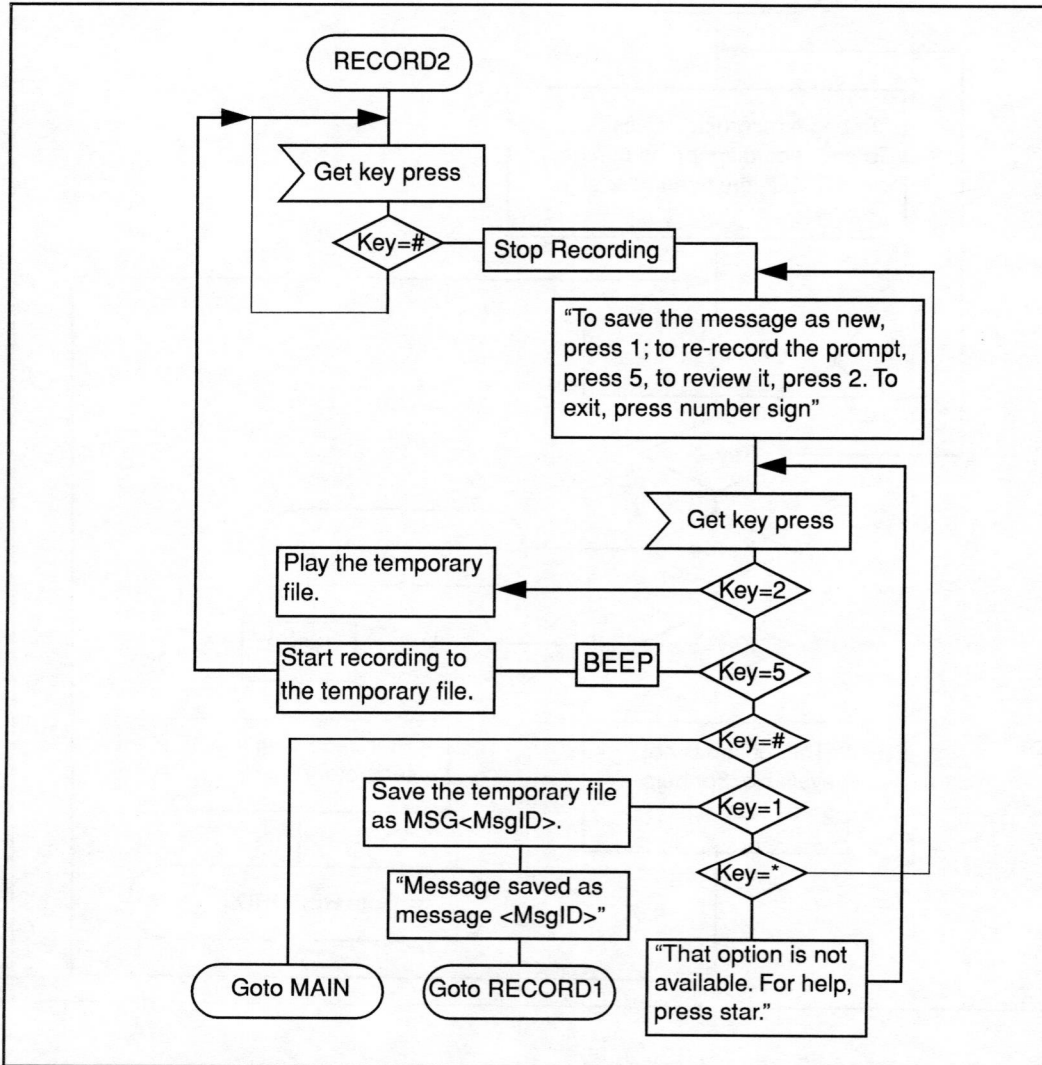


Record Menu - part 2

This menu allows you to record and save the recorded message file.

Figure 24

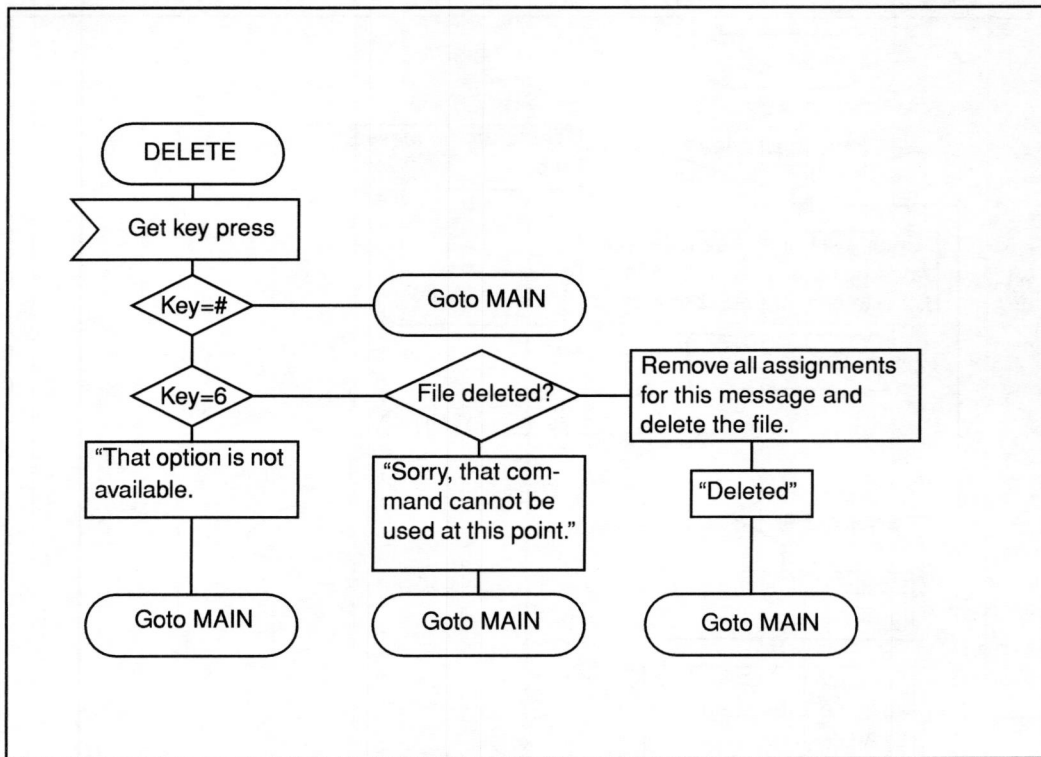
Record menu flowchart, part 2



Delete Menu

The Delete menu is accessed from the Main Menu by dialing 76. This function deletes the message from an assignment.

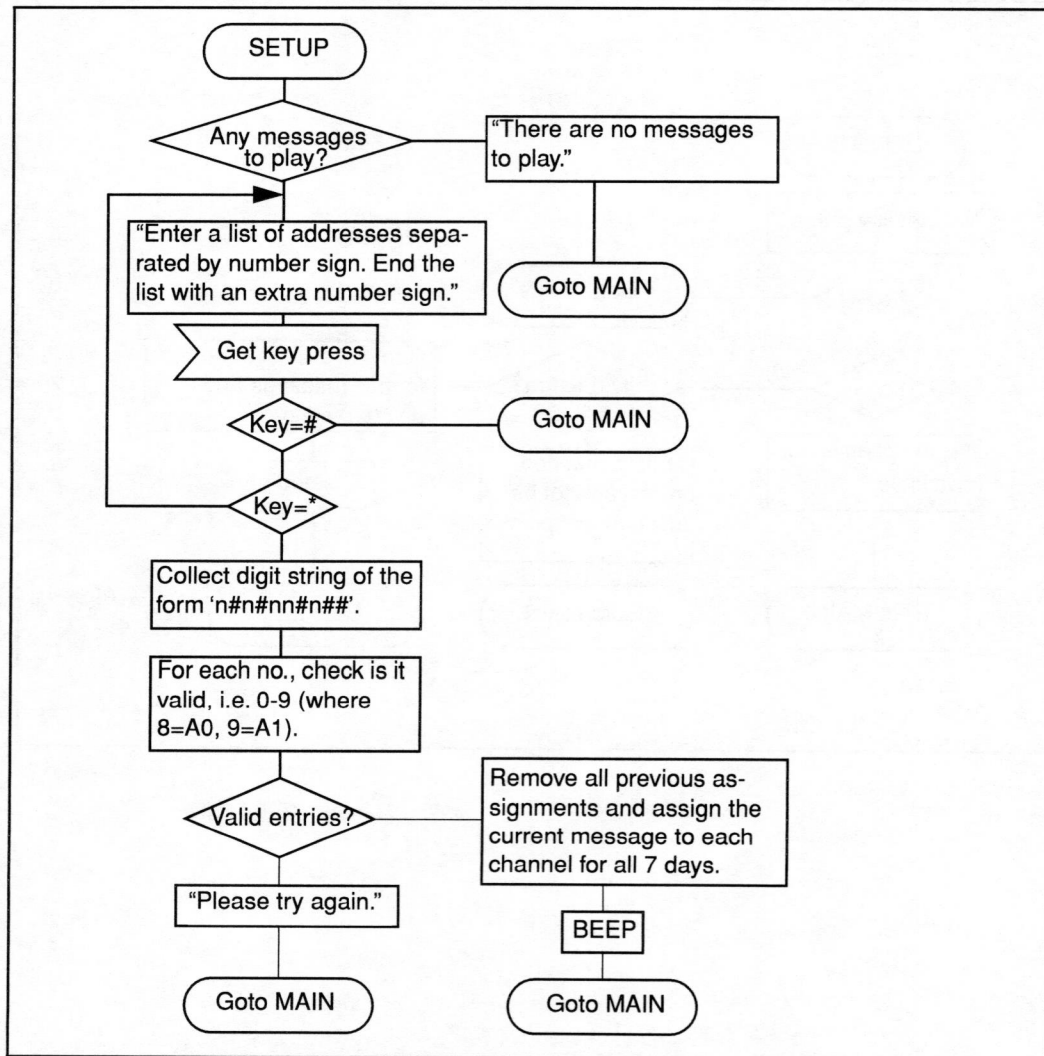
Figure 25
Delete menu flowchart



Setup Menu

This menu is accessed by dialing 1 in the Main Menu. It assigns messages to RAN channels.

Figure 26
Setup menu flowchart



RAN Application: Terminal-based OA&M

This chapter describes the terminal-based OA&M access using menus and commands:

- screens and commands supported by the terminal-based OA&M application
- special feature operation

The software described here is part of the MIRAN-specific OA&M tool running under VxWorks and is independent of Meridian 1 software.

General steps in configuring MIRAN

To give you a general sequence of steps in configuring MIRAN functions and then using the terminal-based OA&M access to configure system RAN and MOH applications, follow the steps below:

- 1 Configure the RAN and MOH trunk route and trunk data block, as described in “MIRAN configuration” on page 62, by using LD 16 and LD 14 programs. This step is completed during installation and configuration (as described in *Installation and configuration* chapter).
- 2 Configure DID trunk for the telephone set-based OA&M access, if required. For a configuration example, refer to “DID configuration for telephone set-based OA&M access” on page 181. This step is completed during installation and configuration (*Installation and configuration* chapter).
- 3 Setup the terminal for the terminal-based OA&M access. This step is completed during system installation and configuration and as described in “Configuring the terminal for terminal-based OA&M access” on page 74 the *Installation and configuration* chapter.

- 4 Enter your password. The default password for distributor and user access is "4321".
- 5 Enter the keycode, if not already entered. Refer to "Keycode Entry" on page 139.

Note: The keycode is entered using the terminal only when MIRAN is first installed into Option 11E/11C or if it is purchased as merchandize. A new keycode has to be entered after each software or channel capacity upgrade. However, the keycode is preloaded in the factory when MIRAN is ordered with a Meridian 1 system option and does not have to be entered on the terminal.

- 6 Record messages. From the Main Menu select RAN Administration menu and from this menu select Record Message screen. Refer to "Record Messages" on page 122. You can now record one or more messages you can then assign to different channels.
- 7 Assign a message. From the Message Commands menu, select Assign Message screen to assign a specific announcement file (you just recorded or you selected from the existing recording files) to a specific channel with a specific starting time. You can repeat this step for other files and channels. Refer to "Assign Message" on page 118.
- 8 Backup the original configuration onto the drive C:, or a PCMCIA card in drive A:, when equipped.
- 9 Copy new files (if first installing or upgrading software) from drive A: to drive C:. Remove the PCMCIA from drive A: and store in a safe place for future use or in case the MIRAN card fails. This would allow you to copy the configuration into the new MIRAN without having to re-configure the system and re-record messages.

Description of terminal-based OA&M

The terminal-based OA&M application is provided through the RS-232 maintenance port on a MIRAN card. The MIRAN is connected directly to a VT-100 terminal or to a PC running a terminal emulation program.

Up to 16 MIRAN cards can be interconnected using the RS-232 ports to create a simple LAN. This LAN daisy-chain connection allows maintenance of all MIRAN cards from a single terminal.

There are two ways to use a terminal-based OA&M user interface to access all commands and options:

- Use the menu system
- Enter commands on the command line

To run the terminal-based user interface, configure the VT-100 terminal emulation parameters as shown below in Table 24.

Table 24
Terminal configuration parameters

Parameter	Setting
Transmission rate	9600 baud
Data bits; stop bit	8
Stop bit	1
Parity	No
Flow control	None

Note: If you are using WindowsTM based terminal emulation, you have to disable the CTRL and ARROWS keys by using Windows, because these keys are used by the OA&M access to traverse the menus.

Logon screen

This screen appears when you press the Enter key after you connect the terminal to the MIRAN maintenance port. The prompt displays the **VLAN ID nn**, where **nn** is the MIRAN number in the daisy-chain for the card currently being accessed. The maintenance terminal is always connected to the first MIRAN in the LAN and is numbered 00 automatically.

This Logon screen allows you to log in by entering the password or to select **Status** to display the Status screen without entering the password.

```
[10002345]                - Log On -
[VLAN ID 00]

###   ###   ##   #####   ###   ###   ##
## ## ## ## ## ## ## ## ## ## ##
## ### ## ## ## ## ## ## ## ## ##
## # ## ## #####   #####   ## ## ##
##   ## ## ## ## ## ## ## ## ## ##
##   ## ## ## ## ## ## ## ## ## ##

Meridian Integrated RAN Application
Version x.xx
Copyright (c) Nortel Ltd. 1996

Password: ->4321 <-

- Log on -

- Status -

- Next Pack -

- Previous Pack -

Keycode Validated
```

Log on - can be selected only after you first enter the password.

Status - is used to display the Status screen without logging on.

Next/Previous Pack - selects one of the other MIRAN cards, if equipped.

Status screen

This screen is displayed on the terminal when you select *Status* in the Logon screen. It displays the current status of the RAN Application version and release, the board status, the current time, and the status of the 8 one-to-one channels and two cross-connect channels. To display up-to-date channels status, refreshed the screen by pressing the spacebar.

```

[10002345]                                -Pack Status-                                [NT_DISTIB]

Board Enabled: No          Current Time: MON 12:25:09

Channel  Enable  Application  Playback Level  Message Source  Active
0        Y      STOP/START RAN    13             A:MSG01.ULW    Y
1        Y      STOP/START RAN    13             A:MSG02.ULW    Y
2        Y      STOP/START RAN    13             A:MSG03.ULW    Y
3        Y      STOP/START RAN    13             A:MSG04.ULW    Y
4        N      Unequipped        13             N              N
5        N      Unequipped        13             N              N
6        N      Unequipped        13             N              N
7        N      Set Based          13             N              N

Cross Connect Ports

Port  Function  Application  Level  Message Source  Active
A0    Output   Idle        13     A:MSG01.ULW    N
A0    Input    Idle        13     A:MSG02.ULW    N
A1    Output   Idle        13     A:MSG03.ULW    N
A1    Input    Idle        13     A:MSG04.ULW    N

Press Enter to continue

```

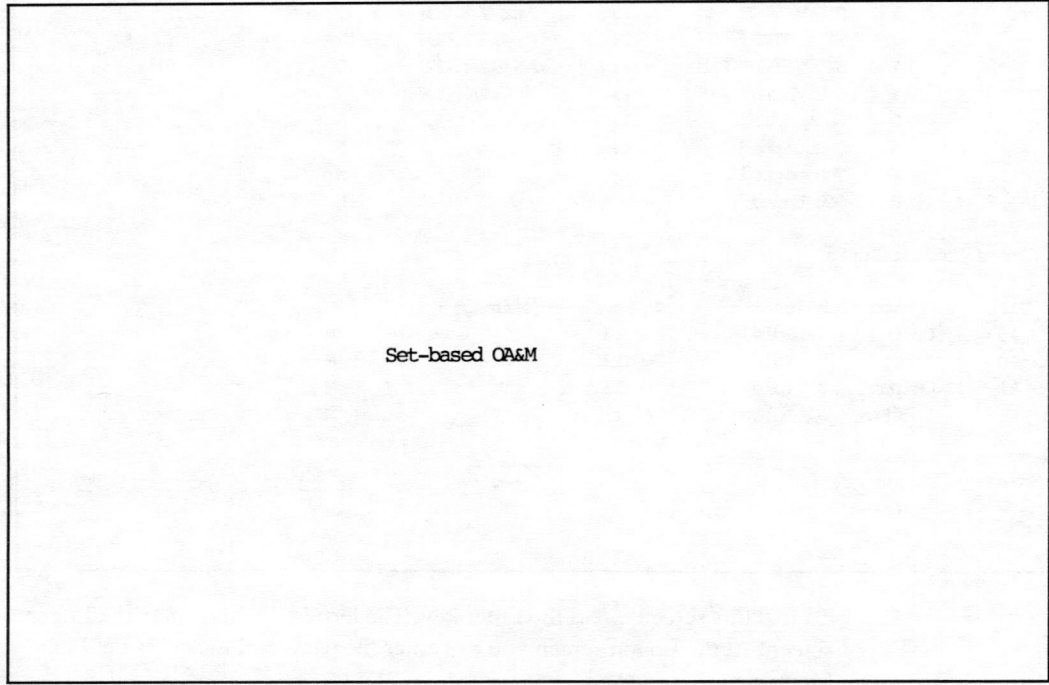
To exit this screen, press the Enter key. The terminal will display the Logon screen. At the Logon screen you can enter the password to access the Main Menu screen.

Setting up telephone set-based OA&M access

To configure the system for the telephone set-based OA&M access, you must:

- 1 Assign channel 7 for the telephone set-based OA&M access, if not already assigned, refer to “OA&M Access Configuration” on page 142.
- 2 Go off-hook and dial the access code.
- 3 MIRAN display shows RA-S indicating that the telephone set-based OA&M is now active and the terminal is locked out until the telephone set goes on-hook.

The following screen is displayed on the terminal as long as the telephone set-based OA&M access is active.



Set-based OA&M

Main Menu

The Main Menu screen is displayed when you enter the password and select *Log on* in the Logon screen. Each option listed on the Main Menu leads to another task screen or submenu.

The Main Menu options are four top level submenus:

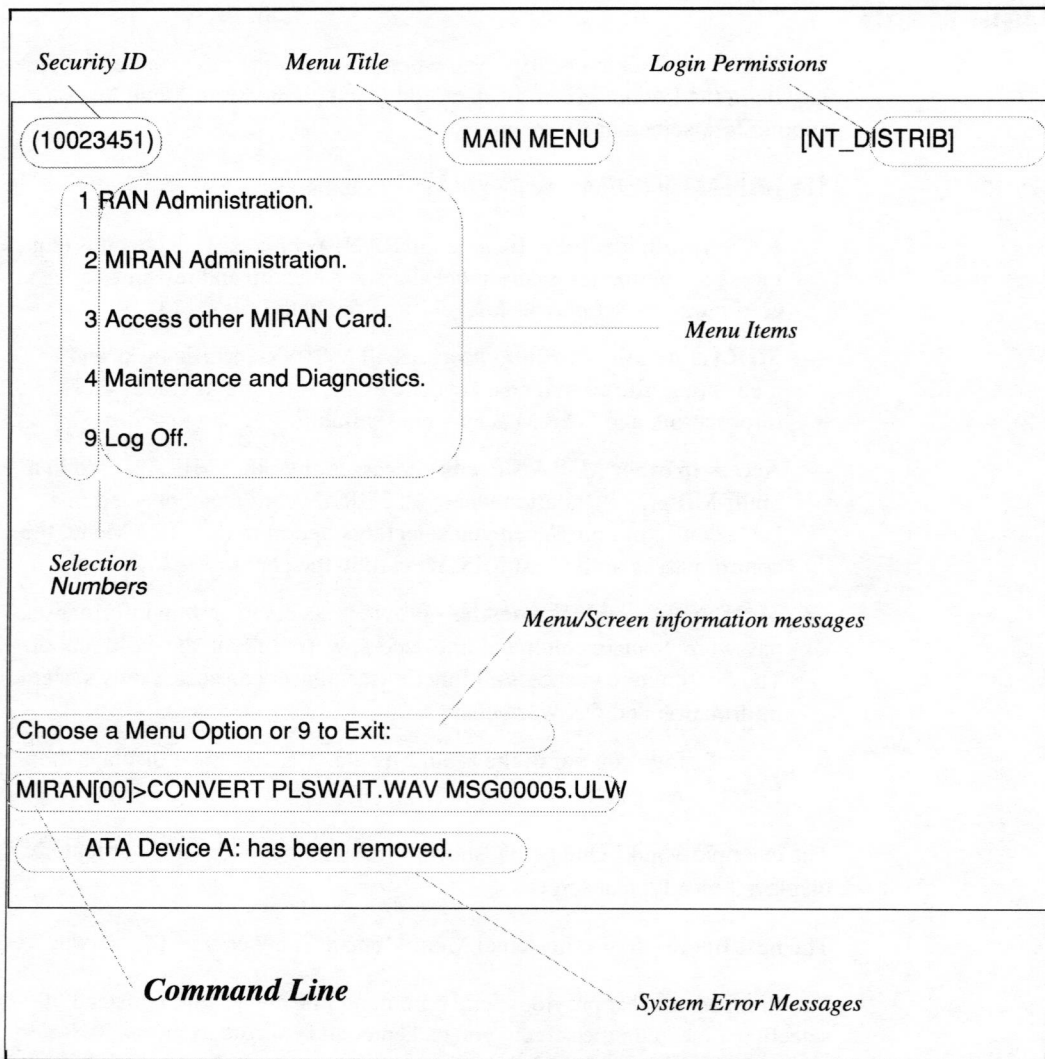
- **RAN Administration** - Includes all RAN-specific tasks and menus (e.g., message commands, operational statistics, backup and restore configuration, set playback levels, and run batch file).
- **MIRAN Administration** - accesses all MIRAN-specific tasks and menus (e.g. file commands, keycode entry, software upgrade, pack information, and OA&M access configuration).
- **Access to other MIRAN cards** - accesses any other MIRAN card in a multi-MIRAN installation where all MIRAN card are connected in a LAN configuration. When you select this option in the Main Menu, the control passes to the next MIRAN card in the chain.
- **Maintenance and Diagnostics** - provides access to system information, password change, command line access, warm reboot, and cold reboot. The distributor can access all functions, and user can access only system information and password change.
- **Logoff** - logs you out of the Main Menu and the terminal displays the Logon screen.

The example Main Menu below shows circles labeling the fields of features displayed on a typical screen.

The next figure shows the actual Main Menu as it appears on the screen.

The Main Menu also provides for a command line entry, where instead of selecting a menu on the screen, you can enter and execute a command. Refer to the example Main Menu below that shows the command line at the bottom of the screen.

Enter at the command line; **XCOPY A.*.SBC C:** to copy across all of the telephone set-based OA&M prompts.



[10002341]

MAIN MENU

[NT_DISTRIB]

- 1 RAN Administration
- 2 MIRAN Administration
- 3 Access other MIRAN Card
- 4 Maintenance and Diagnostics

- 9 Log Off

Choose a Menu Option or 9 to Exit:

MIRAN [00]>

RAN Administration

The RAN Administration provides a set of menus that control RAN configuration, display operational statistics, set playback level, and run batch files.

To access the RAN Administration menu, press '1' in the Main Menu.

[10002341]

-RAN Administration-

[NT_DISTRIB]

- 1 Message Commands
- 2 Operational Statistics
- 3 Backup Configuration
- 4 Restore Configuration
- 5 Playback Level
- 6 Run Batch File
- 9 Back to Previous Menu...

Choose a Menu Option or 9 to Exit:

MIRAN[00]>

- **Message Commands** - displays the Message Commands menu that deals with RAN messages
- **Operational Statistics** - displays RAN channel usage statistics
- **Backup Configuration** - saves announcement messages to a disk
- **Restore Configuration** - restores the announcement messages from a disk to the MIRAN

- **Set Playback Level** - sets the sound volume (loudness) for each channel
- **Run Batch File** - executes a batch file containing OA&M commands. It allows multiple channel assignments to be performed with a single command used for switching RAN in and out of assignment for emergency or holidays time table and announcements types.

Message Commands

Press '1' on the RAN administration menu to access the Message Commands submenu.

```
[10002345]          -Message Commands-          [NT_DISTRIB]

1 Assign Message
2 List Assignments
3 Copy Assignments
4 Clear Assignments
5 Record Message
6 Play Message
7 Convert Message File

9 Back to Previous Menu...

Choose a Menu Option or 9 to Exit:
MIRAN[00]>
```

The Message Commands entries are used to control message assignments and recording of new messages on the MIRAN. Each entry represents a menu that follows below.

Assign Message

Assign Message menu allows you to assign messages to specific channels and specify the time and day when the message will be active.

[10002345]	-Assign Message-	[NT_DISTRIB]
Day: -> Wed <-		
Channel: 2		
Filename: A:AARAN.U1W		
- Browse -		
Time:00:00		
Abstract:		
- Assign -		
- Exit -		

- **Day** - specifies the day of the week by entering the three letter abbreviation of the day (Mon, Tue, Wed, Thu, Fri, Sat, or Sun). If you enter “*”, you assign the message to all days of the week.
- **Channel** - enter a channel number from 0 to 7 to specify an internal channel, or A0 or A1 to assign the message to an cross-connect channel. The star (*) can be used to assign the same message to all internal channels (0-7) at the same time. Channel 7 may not be used if telephone set-based OA&M access is also established.
- **Filename** - enter the filename of a voice message or use the Browse feature to browse through the available filenames and select one. A file name consists of 8 alphanumeric characters a dot and 3-character extension.
- **Browse** - is used to scan through the list of available messages.

- **Time** - enter time to start the message in the 24 hour clock form (HH:MM). The star (*) can be used to assign a message for an entire day. All previous assignments for that day and channel are deleted and replaced with an assignment starting at 00:00 time. If you specify 00:00, all assignments for 00:00 are changed and all other assignments stay the same.
- **Abstract** - add informative text about the message assignment.
- **Assign** - assigns the selected message to the channel for the specified day and time.
- **Exit** - allows you to exit the Assign Message screen and return to the previous menu without assigning anything.

List Assignments

This screen allows you to display the message assignments for a given channel on a given day of the week.

[10002345]	- Show Assignments -	[NT_DISTRIB]
Day: -> THU <-		
Channel: 2		
- Show Assignments-		
- Exit -		

- **Day** - specifies the day of the week that you wish to display the assignments, by entering the three letter abbreviation of the day (Mon, Tue, Wed, Thu, Fri, Sat, or Sun).

- **Channel** - enter a channel number from 0 to 7 to specify an internal channel, or A0 or A1 to specify a cross-connect channel you wish to display the assignments.
- **Show** - is selected to display the assignments.
- **Exit** - allows you to exit the List Assignments screen and return to the previous menu without displaying anything.

Copy Assignments

This screen is used to copy assignments from one channel for a given day into one or more channels for their given days. This way, a complex assignment for one day can be copied to one or more other days of the week.

```
[10002345]          - Copy Assignments -          [NT_DISTRIB]

      Day: -> Wed <-

      Channel: 0

      Destination Day: Thu

      Destination Channel: 6

                                - Copy Assignments -
                                      - Exit -
```

- **Day** - specifies the day of the week that you wish to copy the assignments from. Enter the three letter abbreviation of the day (Mon, Tue, Wed, Thu, Fri, Sat, or Sun).

- **Channel** - enter a channel number from 0 to 7 to specify an internal channel, or A0 or A1 to specify a cross-connect channel you wish to copy the assignments from.
- **Destination Day** - specifies the day of the week that you wish to copy the assignments to.
- **Destination Channel** - enter a channel number from 0 to 7 to specify an internal channel, or A0 or A1 to specify a cross-connect channel you wish to copy the assignments to.
- **Copy Assignments** - select it to execute copying from the specified channel to the specified channel. If you enter Wed channel *, system will copy all assignments for Wednesday for that channel.
- **Exit** - allows you to exit the Copy Assignments screen and return to the previous menu without copying anything.

Clear Assignments

This screen allows you to clear individual or multiple message assignments for a given day of the week.

[10002345]	- Clear Assignments -	[NT_DISTRIB]
Day: -> Mon <-		
Channel: *		
Time: 00:00		
- Unassign -		
- Exit -		

- **Day** - specifies the day of the week that you wish to clear the assignments. Enter the three letter abbreviation of the day (Mon, Tue, Wed, Thu, Fri, Sat, or Sun). By entering "*", you specify the entire week.

- **Channel** - enter a channel number from 0 to 7 to specify an internal channel, or A0 or A1 to specify a cross-connect channel you wish to clear the assignments. The star (*) can be used to clear all assignments for internal channels 0-7.
- **Time** - enter time of the message assignment you wish to clear. The time is specified in the 24 hour clock form (HH:MM). If you enter "*", all assignments for that channel for that day will be cleared.
- **Unassign** - clears the specified assignments.
- **Exit** - allows you to exit the Clear Assignments screen and return to the previous menu without clearing anything.

Record Messages

This screen controls the recording of messages on the MIRAN card.

[10002345]	- Record Message -	[NT_DISTRIB]
Audio Input: -> A0 <-		
Filename:c:philip.ULW		
- Browse -		
Duration: 20		
- Start Recording -		
- Stop Recording -		
- Exit -		

- **Audio Input** - enter an internal recording channel A0 or A1. Only these two channels can be used for message recording.

- **Filename** - enter the filename of a voice message and use the Browse feature to browse through the existing filenames to make sure that the file you are about to record does not already exist. A file name consists of 8 alphanumeric characters a dot and 3-character extension.
- **Browse** - is used to scan through the list of available messages.
- **Duration** - specifies the duration of a recording or select Stop Recording. You must account for full duration of recording.
- **Start/Stop Recording** - starts and stops the recording process. Recording will stop either if duration time is reached, the file system is full, or the Stop Recording option is selected.
- **Exit** - allows you to exit the Record Message screen and return to the previous menu without recording anything.

Play Message

This screen allows you to check messages by playing them back. It does not allow you to change messages assignments.

[10002345]	- Play Message -	[NT_DISTRIB]
Channel: -> A0 <-		
Filename:A:MSG0001.ULW		
- Browse -		
- Start Playback -		
- Stop Playback -		
- Exit -		

To verify a message, setup a test route to play the message. After the message is accepted, you can assign it to a regular route.

- **Channel** - enter channel A0 or A1 to specify an internal recording channel you wish to use. Only these two channels can be used play message recording.
- **Filename** - enter the filename of a voice message you wish to play back or use the Browse feature to browse through the existing filenames to select the one you wish to play back. A file name consists of 8 alphanumeric characters a dot and 3-character extension.
- **Browse** - is used to scan through the list of available messages.
- **Start/Stop Playback** - starts and stops the playback process. Playback will stop either if duration time is reached, the end of file is reached, or the Stop Playback option is selected.
- **Exit** - allows you to exit the Play Message screen and return to the previous menu without recording anything.

Convert Message File

This screen controls the conversion of voice files from one form to another facilitate use of files created in a PC recording environment.

The conversion can be from .ULW format of 8kHz 8-bit PCM to the .WAV format of 8kHz 8-bit PCM with descriptive WAV header.

```
[10002345]          - Convert Message File -          [NT_DISTRIB]

Input Filename: -> A:MSG0002.WAV          <-

                  - Browse -

Output Filename:A:MSG0002.ULW

                  - Convert WAV to PCM -

                  - Convert PCM to WAV -

                  - Exit -
```

Note: The conversion process makes a duplicate copy of the input file, ensure sufficient disk space for the conversion operation and discard unwanted files.

- **Input Filename** - enter the filename of a voice message you wish to convert or use the Browse feature to browse through the existing filenames to select the one you wish to convert. The file must be in the 8.3 format (8 characters a dot and 3 extension characters).
- **Browse** - is used to scan through the list of available messages.
- **Output Filename** - enter the filename of a voice message you converted. If you don't enter the output filename, this filename will have the same name as the input file with the appropriate extension (.WAV, .ALW, or .ULW) based on the conversion used.
- **Convert** - select the appropriate conversion option to convert the input file format into the output file format.
- **Exit** - allows you to exit the Play Message screen and return to the previous menu without recording anything.

Operational Statistics

This screen is used to check the current traffic statistics for the internal channels. The cross-connect channels are not displayed since the MIRAN card has no control over the traffic related to these channels.

[10002345]
- Operational Statistics -
[NT_DISTRIB]

	Last Hour	Average	Last Day	Average	Last Week	Average
00	34	232	122	423	2344	3109
01	34	232	122	423	2344	3109
02	34	232	122	423	2344	3109
03	34	232	122	423	2344	3109
04	34	232	122	423	2344	3109
05	34	232	122	423	2344	3109
06	34	232	122	423	2344	3109
07	34	232	122	423	2344	3109

- Clear Statistics -

- Exit -

Command: RESETSTAT

OK : Statistics Reset

- **Clear Statistics** - select any one of the eight channels and select Clear Statistics to clear the channel statistics
- **Exit** - allows you to exit the Operational Statistics screen and return to the previous menu without affecting the count for each channel.
- **RESETSTAT** - command used to reset current statistics.

Backup Configuration

This screen allows you to backup the MIRAN configuration to a specified storage device.

[10002345]	- Backup Configuration -	[NT_DISTRIB]
Device:C:		
- Backup Configuration -		
- Exit -		

- **Device** - select the storage device where you wish to backup the configuration. This is usually a PCMCIA Flash card in the external drive A:.
- **Backup Configuration** - starts the backup process to the specified device.
- **Exit** - allows you to exit the Backup Configuration screen and return to the previous menu without performing backup or exiting the screen after completing the backup.

Restore Configuration

This screen allows you to restore the MIRAN configuration to the internal Flash memory from a backup device.

[10002345]	- Restore Configuration -	[NT_DISTRIB]
Device:A:		
- Restore Configuration -		
- Exit -		

- **Device** - select the storage device where the backup configuration is stored. This is usually a PCMCIA Flash card in the external drive A:.
- **Restore Configuration** - starts the restoration process from the specified device.
- **Exit** - allows you to exit the Restore Configuration screen and return to the previous menu without performing configuration restoration or exiting the screen after completing the restoration.

Playback Levels

This screen allows you to set the playback level (loudness) to be set independently for each channel.

```

[10002345]          - Playback Levels -          [NT_DISTRIB]

Internal Channels
Companding law: Mu-law

0 13 1 13 2 13 3 13
4 13 5 13 6 13 7 13

External Channels
Companding law: Mu-law
A0 13    A1 13

Channel: -> A1 <-

Level: 13

- Set Level -

- Change Codec Law -

- Exit -
  
```

- **Internal Channels** - displays internal channel options and their playback levels
- **External Channels** - displays external channel options and their playback levels
- **Channel** - enter a internal channel number from 0 to 7 to specify an internal channel, or A0 or A1 to specify an external cross-connect channel you wish to change the playback level.
- **Level** - enter a number from 0 to 15 to specify the level or loudness of the message playback. The lowest level is 0, 8 is nominal, and 15 is the highest level or the loudest.
- **Set Level** - saves the audio level you made for the channel.

- **Change Codec Law** - saves the companding law change you made for the channel.
- **Exit** - allows you to exit the Set Playback Level screen and return to the previous menu without changing the level of a channel.

Run Batch Files

This menu allows you to select the file storage drive you wish to access and display the files contained on that logical drive. After you selected an option, a screen will appear displaying files. Refer to Choose a File screen that follows.

```
[10002345]          - Run Batch File -          [NT_DISTIB]

Filename: ->          <-

          - Browse -

          - Run Batch File -

          - Exit -
```

- **Filename** - enter the filename of the batch file you wish to run.
- **Browse** - is used to scan through the list of available batch files.
- **Run Batch File** - starts the execution (run) of the selected batch file.
- **Exit** - allows you to exit the Run Batch File screen and return to the previous menu without running the batch file.

MIRAN Administration

This screen lists a set of MIRAN administration menus that control the MIRAN configuration, file management, upgrades, and OA&M access.

[10002345]	- MIRAN Administration -	[NT_DISTRIB]
1 File Commands		
2 Keycode Entry		
3 Software Upgrade		
4 System Information		
5 OA&M Access Configuration		
9 Back to Previous Menu...		
Choose a Menu Option or 9 to Exit:		
MIRAN[00]>		

- **File Commands** - displays a menu that performs file manipulations.
- **Keycode Entry** - controls the upgrade of the MIRAN port size from small to medium and large as well as software upgrades.
- **Software Upgrade** - allows software upgrade using the PCMCIA card. A keycode is required for software upgrade but it is not required for bug fixes.
- **System Information** - displays the MIRAN hardware platform configuration and software release information.
- **OA&M Access Configuration** - controls the telephone set based OA&M access to the MIRAN.
- **Back to Previous Menu** - returns you to the previous menu.

File Commands

This screen accesses all MIRAN file management commands.

```
[10002345]          - File Commands-          [NT_DISTRIB]

1 List Files
2 Copy File
3 Delete File
4 Rename File
5 Move File

9 Back to Previous Menu...
```

Choose a Menu Option or 9 to Exit:
MIRAN[00]>

- **List Files** - allows you to browse through the directory file listings for the internal drive C: and any additional PCMCIA-based stored file lists.
- **Copy File** - allows you to a copy file to a different file on the same volume or to other volumes.
- **Delete File** - deletes a selected file.
- **Rename File** - allows you to rename any existing file.
- **Move File** - copies a file to the specified location and deletes the original source file.
- **Back to Previous Menu** - returns you to the previous menu.

List Files

This menu allows you to select the file storage drive you wish to access and display the files contained on that logical drive. After you selected an option, a screen will appear displaying files. Refer to File Display Screen on the next page.

[10002345]	- Choose Device -	[NT_DISTRIB]
1 Internal Storage C:		
2 External ATA Card A:		
3 External ATA Card B:		
4 All Devices		
9 Exit		
Choose a Device or 9 to Exit		

- **Internal Storage C:** - is on board Flash drive. Select this option to display its files.
- **External ATA Card A:** - is the external PCMCIA ATA Flash card installed into the external slot A. Select this option to display its files.
- **External ATA Card B:** - is the PCMCIA ATA Flash card installed into the PCMCIA slot B located on the MIRAN pc board. Select this option to display its files.
- **All Devices** - displays files located on all drives.
- **Exit** - returns you to the previous menu without choosing a device.

File Display

This screen displays files for the selected volume or drive from the previous menu.

[10002345]
- View Files -
[NT_DISTRIB]

	Filename	Size	Time	Date	Description
1	C:HOLIDAY.BAT	131072	10:15	20/10/96	.bat file.
1	C:ENYA.ULW	131072	12:10	22/10/96	.bat file.
1	C:ALL_BUSY.ULW	131072	09:25	10/11/96	.bat file.
1	C:2ND_RAN.ULW	131072	13:15	20/11/96	.bat file.

9 Exit

4 Files

Page 1 of 1

Select a File or press Enter for more

- **Filename** - the name of the file on the selected drive. If more than 8 files exist, press the Enter key to display the rest of the files. The type of file is designated by the extension (.BAT, .ALW, .ULW).
- **Size** - shows the size of the file in bytes.
- **Time and Date** - is the time date the file was installed on the drive.
- **Description** - describes the type of file. In this example all the files are considered batch files (.bat).
- **Exit** - to exit the screen.

The screen also indicates the number of files listed and the page where these files are displayed. If the first page is full and there are more files on the second page, you can press Enter to display the next page.

Copy File

This screen is used to copy a file within a volume or drive, from one drive to the other, or to backup files onto a disk.

CAUTION

File transfer between drives should be performed with the MIRAN card disabled.

```
[10002345]          - Copy File -          [NT_DISTRIB]

Enter Source: -> A:xxxxxx.ULW <-

                - Browse -

Enter Destination: C:xxxxxx.ULW

                - Copy -

                - Exit -
```

- **Enter Source** - is the file you wish to copy.
- **Browse** - is used to scan through the list of available files to select the file you wish to copy instead of typing in the name of the file.
- **Enter Destination** - is the filename where the file should be copied.
- **Copy** - copies the file you selected (sources file) into the destination filename location. If there is a filename conflict or the source filename does not exist, and error will be displayed.
- **Exit** - allows you to exit the screen before copy is performed or after the copy command has been executed.

Delete File

CAUTION

Before you delete a file, make sure that the file is not active at that time.

This screen allows you to delete a file from any of the available drives.

[10002345]

- Delete File -

[NT_DISTRIB]

Filename: ->C:xxxxxxx.ULW <-

- Browse -

- Delete -

- Exit -

- **Filename** - enter the name of the file you wish to delete.
- **Browse** - allows you to scan through files in any drive and select the file you wish to delete.
- **Delete** - deletes the specified file from the Flash memory.
- **Exit** - allows you to exit the screen without deleting a file or to exit the screen after you deleted the file.

Rename File

This screen is used to rename a file. The file can be located on any available volume (drive).

CAUTION

Before you rename a file, make sure that the file is not active at that time.

```
[10002345]          - Rename File -          [NT_DISTRIB]

Filename: ->A:xxxxxx.ULW <-

                - Browse -

New Name: -> A:yyyyyy.ULW <-

                - Rename -

                - Exit -
```

- **Filename** - is the original file you wish to rename.
- **Browse** - allows you to scan through files in any drive and select the file you wish to rename.
- **New Name** - is the new name of the old file.
- **Rename** - renames the specified file.
- **Exit** - allows you to exit the screen without renaming a file or to exit the screen after you renamed the file.

Move File

This screen allows you to move files between any available disk volumes.

CAUTION

Before you move a file, make sure that the file is not active at that time.

```
[10002345]          - Move File -          [NT_DISTRIB]

Enter Source: -> A:zzzzzz.UJW <-

          - Browse -

Enter Destination: ->C:zzzzzz.UJW <-

          - Move File -

          - Exit -
```

- **Enter Source** - is the file you wish to move.
- **Browse** - is used to scan through the list of available files to select the file you wish to move instead of typing in the name of the file.
- **Enter Destination** - is the filename where the file should be moved.
- **Move File** - moves the file you selected (sources file) into the destination filename location. Following the successful copy of the source file into the destination location, the source filename is deleted.
- **Exit** - allows you to exit the screen before the move is performed or after the move command has been executed.

Keycode Entry

This screen is used to enter a new keycode after a hardware or software upgrade to enable the upgrade.

[10002345]	- Keycode Entry -	[NT_DISTRIB]
<u>Current Configuration</u>		
Version: 1.30		
PARMS: INT= 8 EXT= 2		
KEYCODE: 01476536 42542266 74412263		
<u>New Parameters</u>		
Internal Ports:		
External Ports:		
Key Code:		
- Execute -		
- Exit -		

- **Current Configuration** - displays the currently installed configuration that includes the application name and version, hardware ports, and the current keycode.
- **New Parameters** - displays the MIRAN new port option and the new keycode.
- **Internal Ports** - displays the number of available internal one-to-one ports.
- **External Ports** - displays the number of available cross-connect channels.
- **Key Code** - enter a new 24-digit keycode as 3 groups of 8 digits separated by spaces. If incorrect keycode is entered, a message is displayed indicating keycode mismatch.

- **Execute** - executes the new keycode and enables the upgrade.
- **Exit** - you can exit the screen before or after you execute the upgrade.

Software Upgrade

If a software upgrade is performed, an new keycode will be required. For a bug fix, a new keycode is not required.

CAUTION

Do not reboot or power down the MIRAN card during software upgrade process. When the upgrade is complete, the system acknowledges with an OK. **After OK is displayed, you must COLD REBOOT the card to activate the software upgrade.**

This screen allows you to perform the software upgrade on the MIRAN .

```
[10002345]          - Software Upgrade -          [NT_DISTRIB]

Filename: ->A:205B1912.130 <-

          - Browse -
          - Upgrade -
          - Exit -
```

- **Filename** - is the file you wish to download onto the MIRAN internal Flash memory to upgrade the current software.
- **Browse** - is used to scan through the list of available upgrade files to select the file you wish to download into the internal Flash memory. The selected file appears in the Filename space on the screen.

- **Upgrade** - places the selected file into the internal program Flash memory on the MIRAN card.
- **Exit** - allows you to exit the screen before the software upgrade is performed or after the Perform Upgrade command has been executed.

Note: Do not reboot or power down the MIRAN card during software upgrade process.

System Information

This screen displays the current hardware and software configuration of the MIRAN card. This information can be used when diagnosing hardware and software issues that may be related to the product release.

[10002345]	- System Info -	[NT_DISTRIB]
<u>Hardware Configuration</u>		
CPU: 486DX4-100		
Level 2 Cache: Not Installed		
System Memory: 4 Mbytes		
Disk A: (External ATA): Installed		
Disk B: (Internal ATA): Not Installed		
Disk C: (Internal PCI): 2 Mbytes		
<u>Software Configuration</u>		
Application: NTAG37AA Rls 1.30		
8051XA Firmware: NTAG45AA Rls		
Press Enter to continue		

- **Hardware Configuration** - displays the CPU, system memory, and the status of the drives.

- **Software Configuration** - displays the application, firmware, and software releases.
- **To continue** - press Enter to continue to the next system information page.

OA&M Access Configuration

CAUTION

Before you enable channel 7 for the telephone set-based OA&M access, make sure it is not configured for RAN or MOH. You can also use the command ENBLESET to enable channel 7 for the telephone set.

This screen enables or disables the telephone-based OA&M access to the MIRAN. The default is disabled.

[10002345] - OA&M Access Configuration - [NT_DISTRIB]

Current Configuration

Set Based Access (Channel 7): Enabled

- Enable Set Based Access -

- Disable Set Based Access -

- Exit -

Command: ENBLESET

- **Set Based Access (Channel 7)** - indicates the current status of the telephone set based OA&M access.

- **Enable Set Based Access** - enables the telephone set based OA&M access. It configures channel 7 for this purpose and therefore channel 7 cannot be used for RAN assignments.
- **Disable Set Based Access** - disables the telephone set based OA&M access and allows channel 7 to be used for RAN assignments.
- **Exit** - allows you to exit the screen before or after modifying the current status of channel 7

Maintenance and Diagnostics

This menu provides access to the MIRAN maintenance and diagnostics. It is divided into user and distributor accessible functions.

[10002345]	- Maintenance and Diagnostics -	[NT_DISTRIB]
	<div style="display: flex; justify-content: space-between;"> <div style="width: 80%;"> <p>1 System Information</p> <p>2 Password Change</p> <p>3 Warm Reboot</p> <p>4 Cold Reboot</p> </div> <div style="width: 15%; text-align: center;"> <p>..... User Level</p> <p>..... Distributor Level</p> </div> </div>	
	9 Back to Previous Menu...	
<p>Choose a Menu Option or 9 to Exit:</p> <p>MIRAN[00]></p>		

- **System Information** - displays hardware and software configuration.
- **Password Change** - allows the current password to be changed based on the level of access of the current user.
- **Warm Reboot** - the host is reset by the 8051XA. (Duration 1 minute).

- **Cold Reboot** - invokes full MIRAN reboot. (Duration 2 minutes).
- **Back to Previous Menu** - returns you to the previous menu.

Password Change

This menu is used to change the existing password used for OA&M access. Holder of a password can alter a password of the same level or lower. For example, a user can change only user password, a distributor can change user and distributor passwords.

[10002345]

- Password Change -

[NT_DISTRIB]

1 User Password

2 Distributer Password

User Level

Distributor Level

9 Back to Previous Menu...

Choose a Menu Option or 9 to Exit:
MIRAN[00]>

- **User Password** - is able to access only user level functions.
Note: The user level password must be all numeric.
- **Distributor Password** - is able to access distributor and user functions (distributor password can be alphanumeric).
- **Back to Previous Menu** - returns you to the previous menu.

Password Change - User Password

This screen is used to change the user password (the default password is **4321**). This password can be changed by the user and distributor. The password must be at least four characters long. If the telephone set-based OA&M access is used, the password must be numbers only (no alpha characters are allowed).

[10002345]	- User Password -	[NT_DISTRIB]
Old Password: ->4321	<-	
New Password: ->	<-	
New Password: ->	<-	
- Change -		
- Exit -		

- **Old Password** - is the existing user password.
- **New Password** - replaces the existing password.
- **New Password** - new user password appears after the Change command has been executed.
- **Change** - causes the password to be changed and confirmed.
- **Exit** - exits the screen before changing the password or alternately, exits the screen after the change password was executed.

Password Change - Distributor Password

This screen is used to change the distributors password (the default password is **4321**). This password can be changed by the distributor. The password must be at least four characters long.

[10002345]	- Distributor Password -	[NT_DISTRIB]
Old Password: ->4321	<-	
New Password: ->	<-	
New Password: ->	<-	
	- Change -	
	- Exit -	

- **Old Password** - is the existing distributor password.
- **New Password** - replaces the existing distributor password.
- **New Password** - new distributor password appears after the Change command has been executed.
- **Change** - causes the password to be changed and confirmed.
- **Exit** - exits the screen before changing the password or alternately, exits the screen after the change password was executed.

MIRAN OA&M command set

Instead of using the menu structure described in the first half of this chapter, you can enter commands on the command line in the Main Menu. This is advantageous to an experienced user who knows what command to use therefore does not have to navigate through the OA&M menu structure.

Most of these commands can also be used in batch files to allow complex configurations to be executed in a single command.

Files are specified using DOS convention of an 8-character filename followed by a 3-character extension. The filename is normally preceded by a device descriptor as shown in Table 25.

Table 25
MIRAN disk drives

Drive name	Designation
External PCMCIA Drive	A:
Internal PCMCIA Drive	B:
Internal Flash Drive	C:

The MIRAN channels are named as shown in Table 26:

Table 26
Channel designations

Channels	Designation
Internal	0-7
External (cross-connect)	A0, A1
Analog Inputs	ANALOG0, ANALOG1

These designators are used on the command line when executing MIRAN commands.

OA&M Command summary

OA&M commands are used instead of using different menus to perform system applications configuration. You enter a command on the command line at the bottom of the Main Menu screen, refer to fields description in the screen of "Main Menu" on page 113. This screen also shows an example of a command entered on the command line.

Example: **MIRAN[00]>CONVERT PLSWAIT.WAV MSG00005.ULW**

Table 27 lists MIRAN OA&M commands along with their descriptions, parameters, and syntax definitions. It also lists terminal-based OA&M access commands that can be entered on the command line on the terminal screen.

Table 27
OA&M command summary (Part 1 of 4)

Command	Parameters	Function
ACCESS	[VLAN Number]	Passthru to another MIRAN card over VLAN.
ASSIGN	[Day] [Channel] [Device:File- name.PCM] [Time]	Assign a message to a channel on a given time and date. Wild cards are allowed.
ASSIGNCOPY	[Day] [Channel] [Day] [Channel]	Copy an assignment for a given day and channel to another day and channel.
BACKUP	[Device]	Backs-up the assignment information to the internal C: drive.
CONV_PCM_WAV	[Input Device:File- name.ULW] [Output Device:File- name.WAV]	Convert a file from PCM to WAV
CONV_WAV_PCM	[Input Device:File- name.WAV] [Output Device:File- name.ULW]	Convert a file from WAV to PCM

Table 27
OA&M command summary (Part 2 of 4)

Command	Parameters	Function
COPY	[Source Device:File-name.Type] [Destination Device:File-name.Type]	Copy a disk file.
DELETE	[Device:File-name.Type]	Delete a disk file.
DISABLESET		Disable Set-Based Channel 7
DISTRIBPASS	[Old Password] [New Password1] [New Password1]	Change the distributor password.
ENABLESET		Enable Set-Based Channel 7.
KEYCODE	[Keycode]	Capacity upgrade by means of a keycode.
LIST	[Device:File-name.Type]	List files for a given volume.
LISTALL	[Filename.Type]	List files for all volumes.
LOGOFF		Log off and bring user back to the login screen.
MOVE	[Source Device:File-name.Type] [Destination Device:File-name.Type]	Move a disk file.
PLAY	[Channel] [Device:File-name.Type]	Play a voice file on a given channel.
PLAYLEV	[Channel] [Level]	Set the playback level for a particular channel.
PLAYSTOP	[Channel]	Stop playback of a file on a given channel.

Table 27
OA&M command summary (Part 3 of 4)

Command	Parameters	Function
RECORD	[Channel] [Device:File-name.Type] [Duration]	Record from a given channel to a file for a given duration.
RECORDSTOP	[Channel]	Stop recording on a given channel.
RENAME	[Device:Old_File_Name.Type] [New_File_Name.Type]	Rename a disk file.
RESETSTAT		Reset channel statistics.
RESTORE	[Device]	Restore the backed-up configuration from the C: drive.
RUN	[Device:File-name.BAT]	Run a batch file.
SETDATE	[Day of Month/Month/Year]	Set the date.
SETDAY	[Day]	Set the day-of-week.
SETTIME	[Hour:Min]	Set the time-of-day.
SHOW	[Day] [Channel]	Lists the assignments for a given day and channel.
STATS		Show channel statistics screen.
STATUS		Show pack status screen.
SW_UPGRADE	[Device:File-name.Type]	Software upgrade from disk file.
SYSINFO		Bring user to the system information screen.

Table 27
OA&M command summary (Part 4 of 4)

Command	Parameters	Function
TIME		Show the current day, time, and date
UNASSIGN	[Day] [Channel] [Time]	Unassign a message from a given channel.
USERPASS	[Old Password] [New Password1] [New Password1]	Change the user password.

OA&M Command Syntax

The command syntax explains in detail each command and its parameters.

Operational Statistics

Displays a report of the RAN statistics.

Syntax **STATS**

System Information

Displays a report of the system hardware configuration.

Syntax **SYSINFO**

Change Password - User, Administrator

MIRAN supports two levels of password security.

Level 1	Distributor	Has restricted diagnostic and debug functions.
Level 2	User	Can change configurations, messages, upgrade software etc. but can not access diagnostics or debug functions.

These commands allow the system passwords to be updated. It will not be possible to change the password of a higher level user.

Syntax: USERPASS [old password] [new password1] [new password1]

DISTRIBPASS [old password] [new password1] [new password1]

Message Commands

The following commands deal with announcement messages.

Message Record

Records a message and stores it in a file. Recording starts immediately and terminates after the specified duration.

Syntax:	RECORD [source] [device:filename] [duration]
[source]	ANALOG1, ANALOG2, CHANNEL 7 (for set)
[device:filename]	Device indicates on which device the file resides. The file name is a maximum of 8 characters with a 3 character extension.
[duration]	Maximum play duration in seconds.

Stop Recording Message

Halts all message recording.

Syntax:	RECORDSTOP
---------	-------------------

Play Message

Plays a message file via the specified port.

Syntax:	PLAY [destination] [device:filename] [duration]
[destination]	A0 or A1 (.ULW or .ALW files only) channel 7 (OA&M channel))
[device:filename]	Device indicates on which device the file resides. The file name is a maximum of 8 characters with a 3 character extension. If ANALOG0 or ANALOG1 is specified, the analog input ports are used as message source.
[duration]	Maximum play duration in seconds. If duration is omitted then all the message will be played.

Stop Playback Message

Stops playback of a message file via the specified port. This can be used to stop playback of a long message before making a new assignment.

Syntax **PLAYSTOP** [channel]
[channel] 0-7, A0, A1

Set Playback Level Message

Sets the playback level for given channel.

Syntax: **PLAYLEV** [channel] [level]
[channel] 0-7 for internal channels
A0, A1 for external channels.
[level] Integer in range 0-15.

Convert Message File

Converts audio files from one format to another. Raw PCM (.ULW or .ALW) is the default format used by the MIRAN card. This utility allows conversion between any combination of the following formats:

WindowsTM format audio file .WAV

Raw PCM .ULW, .ALW

Syntax and description of message files

Syntax: **CONV_PCM_WAV** [src
dev:filename.ULW] [dest
dev:filename.WAV]
[src dev:filename.ext] Device indicates on which device the file
resides. Filename, max 8 characters.
[dest dev:filename.ext] Device indicates on which device the
converted file will be placed. Filename, max 8
characters.

Assign Message

MIRAN supports up to 16 different message assignments per day of the week, as shown below:

Event	File	Description	Time/Date
0	MSG00001.ULW	Please hold for operator.	08:30 Mon
1	MSG00002.ULW	Office is closed.	17:00 Mon
2	MSG00001.ULW	Please hold for operator.	08:30 Tue
3	MSG00002.ULW	Office is closed.	17:00 Tue
4	MSG00001.ULW	Please hold for operator.	08:30 Wed
5	MSG00002.ULW	Office is closed.	17:00 Wed
6	MSG00001.ULW	Please hold for operator.	08:30 Thu
7	MSG00002.ULW	Office is closed.	17:00 Thu
8	MSG00001.ULW	Please hold for operator.	08:30 Fri
9	MSG00002.ULW	Office is closed.	17:00 Fri

The list above will play the message "Please hold for operator" during office hours and the message "Office is closed" for all other times but only for the specified channel.

Syntax:	ASSIGN [day] [channel] [device:filename] [time]
[day]	Specifies the day of the week the assignment is for
[channel]	Specifies to which channel the sound file will be assigned
[dev:filename.ext]	Device indicates on which device the file resides. Filename, max 8 characters. If ANALOG0 or ANALOG1 are specified, the analog input ports will be used as the source of the message
[Time]	This is the time at which the announcement will be switched in. It is in the format HH:MM.

Assign Copy

Copy an assignment for a given day and to channel to another day and channel.

Syntax:	ASSIGNCOPY [sday] [schannel] [dday] [dchannel]
[sday]	Specifies the source day of the week.
[schannel]	Specifies the source channel.
[dday]	Specifies the destination day of the week.
[dchannel]	Specifies the destination channel.

Unassign Event

Unassigning an event will remove it from the event list for the specified channel and will clear the event time and day. The unassign command will be accepted only if the event is the last one on the list.

Syntax:	UNASSIGN [day] [channel] [time]
[day]	Specifies the day of the week the assignment is for.
[channel]	Specifies to which channel the event will be unassigned.
[time]	This is the time at which the announcement will be switched in. It is in the format HH:MM.

Show Assignments

This command displays the assignments for the specified channel for a given day.

Syntax:	SHOW [day] [channel]
[day]	Specifies the day of the week.
[channel]	Specifies to which channel the event will be unassigned.

File Commands

Control RAN and music files.

List Files

Lists all the files on the specified device or drive:.

Syntax: **LIST** [device:] [filename] [.extension]
[device:] Device indicates on which device the file resides.
[filename:] Filename, max 8 characters or wildcard "*". If a filename is omitted then all files on the specified device will be listed.
[.extension:] The extension can be max 3 characters or wildcard "*". If an extension is omitted then all files with a null extension on the specified device will be listed.

List All Files

The function of this command is the same as for the LIST command but is applied over all storage devices.

Syntax: **LISTALL** [filename][.extension]
[filename:] Filename, max 8 characters or wildcard "*". If a filename is omitted then all files on the specified device will be listed.
[.extension:] The extension can be max 3 characters or wildcard "*". If an extension is omitted then all files with a null extension on the specified device will be listed.

Copy File

Allows you to copy files:

Syntax: **COPY** [src device:filename.ext] [dest device:filename.ext]
[src device:filename.ext] Device indicates on which device the file resides. Filename, max 8 characters and .ext max 3 characters.
[dest device:filename.ext] Device indicates on which device the copied file will be placed. Filename, max 8 characters and .ext max 3 characters.

Move File

Allows you to move files from a source to a destination location:

Syntax: **MOVE** [src device:filename.ext] [dest device:filename.ext].

[src Device indicates on which device the file resides.
dev:filename.ext] Filename, max 8 characters and .ext max 3 characters.

[dest Device indicates on which device the moved file will
dev:filename.ext] be placed. Filename, max 8 characters and .ext max 3
 characters.

Delete file

Allows you to delete a file:

Syntax: **DELETE** [dev:filename.ext]

[dev:filename.ext] Device indicates on which device the file resides.
 Filename, max 8 characters and .ext max 3 characters.

Rename File

Allows you to rename a file:

Syntax: **RENAME** [old dev:filename.ext] [new filename.ext].

[old Device indicates on which device the original file
dev:filename.ext] resides. Filename, max 8 characters and .ext max 3
 characters.

[new New filename, max 8 characters and .ext max 3
filename.ext] characters

Backup

This command copies all active configuration message files to the specified destination.:

Syntax: **BACKUP** [destination]

[destination] This can be one of the following, device: - logical
 storage device A:, B: or C:.
 ANALOG0 - Analogue output port 0
 ANALOG1 - Analogue output port 1

Restore

This command restores files that were backed up using the BACKUP command. Only files that were backed up to a logical device can be restored:

Syntax: **RESTORE** [device:]
[device:] Device indicates on which device the backed up file resides.

Upgrade

This command upgrades the MIRAN operating system and application software to the version stored on the specified device:

Syntax: **SW_UPGRADE** [device:]
[device:] Device indicates on which device the new software resides.

Run Batch File

Allows you to run batch files:

Syntax: **RUN** [device:filename.BAT]
[device:filename] Device indicates on which device the file resides.
Filename, max 8 characters. The extension.BAT will be assumed.

Comment

This allows you to write comments:

Syntax: **#**
If the first character of a command string is “#” then the string is assumed to be a comment and is ignored.

Miscellaneous Commands

These commands configure and display time and date parameters.

Set Time of Day

This command sets the time of day.:

Syntax: **SETTIME** [HH:MM]
[HH:MM] Time of day in hours and minutes.

Set Day of Week

This command sets the day of the week.:

Syntax: **SETDAY** [day]
[day] Day of the week, i.e.
 (MON,TUE,WED,THU,FRI,SAT,SUN).

Set the date

This command sets the date for the internal calendar.:

Syntax: **SETDATE** [day of month / month / year]

Display Day and Time

Shows the current day-of-week and time.

Syntax: **TIME**

Show Pack Status

Shows the pack status screen.

Syntax: **STATUS**

Show Statistics

Shows the current statistics for channel usage.

Syntax: **STATS**

Clear Statistics

Resets all of the statistics values back to zero.

Syntax: **RESETSTAT**

Enable Set Based OA&M

This command enables channel 7 to operate as the set based OA&M channel.

Syntax: **ENABLESET**

Disable Set Based OA&M

This command disables channel 7 to operate as the set based OA&M channel.

Syntax: **DISABLESET**

Logoff

This command logs you out of the terminal OA&M.

Syntax: **LOGOFF**

MIRAN Batch File Support

The MIRAN batch files are used to execute sequences of frequently used commands. The syntax of these commands is the same as for the command line. Comments are indicated by a “#” character in the leftmost column.

Restrictions

The maximum number of lines per batch file (including comments) is limited to 255.

Commands and comments can not be mixed on the same line.

Batch file Example

Batch file INIT.BAT

Initial channel assignments

Copy speech file pls_hold from device A: to internal flash device C:

COPY A:PLS_HOLD.ULW C:

Assign “please hold” message to channel 0

ASSIGN MON 0 C:PLS_HOLD.ULW 00:00

Assign music connected to analogue port 0 to channel 1

ASSIGN MON 1 ANALOG0 00:00

Special Features

This section will give examples and setup information for two special RAN features supported by the MIRAN:

- Playing different messages at different times on a single channel
- Setting up emergency messages quickly

Playing different messages at different times

Setup instructions

It will be possible to configure up to 16 different message/times per RAN channel, each message will begin to played at the specified time until the next timed assignment, for example if the message assignment for RAN channel 0 is configured as shown below.

Message Assignment for channel 0:

```
CHANNEL.....TIME.....FILE .....ABSTRACT
..0.....08:30.....MSG00001.ULW .office is open
..0.....13:00.....MSG00002.ULW .closed for lunch
..0.....14:00.....MSG00003.ULW .office is open
..0.....15:00.....MSG00004.ULW .office is closed
```

—————press enter to continue—————

MIRAN[00]

The schedule of messages played to callers is:

- 15:00 - 08:29 MSG00003.ULW “Office is closed”
- 08:30 - 12:29 MSG00001.ULW “Office is open”
- 12:30 - 13:29 MSG00002.ULW “Closed for lunch”
- 13:30 - 14:59 MSG00001.ULW “Office is open”

Note that the last message at 15:00 will be played at the beginning of the following day.

These messages can be assigned using one of the following two methods:

- 1 1. Directly from the command line using the "ASSIGN [channel] [dev:filename.ULW] [hh:mm]" command

```
ASSIGN 0 MSG00004.ULW 08:00
```
- 2 The same message can be assigned using the menu system as follows.
 - a From the MAIN MENU enter 1 for RAN Administration.
 - b In the RAN Administration menu enter 1 for Message Commands.
 - c In the Message Commands menu enter 1 for Assign Message.
 - d Enter channel 0, a list of the message assignments for channel 0 is displayed until the Enter key is pressed.
 - e After the Enter key has been pressed the display lists all the available message files, the user selects the file MSG00004.ULW by entering the number listed beside the file name.
 - f The user is then prompted for the time which is entered as "08:00".
 - g The user is then prompted to confirm the assignment.

After using any of the above methods, the new assignment appears as shown in the screen below.

Message Assignment for channel 0:

```
CHANNEL.....TIME.....FILE.....ABSTRACT
..0.....12:00.....MSG00001.ULW .Partial service is available
..0.....13:00.....MSG00002.ULW .office is open
..0.....14:00.....MSG00003.ULW .closed for lunch
..0.....15:00.....MSG00004.ULW .office is open
..0.....15:00.....MSG00004.ULW .office is closed
```

-----press enter to continue-----

MIRAN[00]

Setting up emergency messages quickly

You can use either of two approaches to rapidly reconfigure the MIRAN card for Emergency Messages:

Method 1: use the RESTORE command

The advantage of this method is that it is not dependent upon the current MIRAN card configuration.

- 1 Pre-configure a MIRAN card as it would operate in an emergency situation.
- 2 Backup the configuration to an external PCMCIA storage card using the BACKUP command.
- 3 During the emergency situation the MIRAN card can be completely re-configured (regardless of the current configuration) by typing the RESTORE command.

Method 2: use a batch file

Approach 2 allows more flexibility than Approach 1 and may not require an external PCMCIA storage card. However, it is more sensitive to the current MIRAN configuration.

- 1 Create a single batch file which will contain all the necessary commands to configure the system with the emergency messages (i.e. ASSIGN and UNASSIGN commands).
- 2 Whenever the emergency situation arises the MIRAN can be reconfigured by typing "RUN [batch file name]".

Maintenance

This chapter describes Meridian Integrated RAN (MIRAN) maintenance tools and procedures to guide you in identifying the MIRAN faults, locating defective equipment, correcting problems by fixing or replacing defective equipment, and verifying the operation of the MIRAN after corrections or replacements have been made.

Maintenance overview

The problem identification should be approached systematically. A problem may have more than one cause. To isolate the cause, a knowledge of MIRAN operation is required. Once the cause is identified, the problem can be corrected by replacing the defective card, connecting accidentally disconnected cables, or correcting the software security problem.

The system and the MIRAN provide built-in self-diagnostic indicators and software and hardware tools. These diagnostic facilities simplify system troubleshooting and reduce mean-time-to-repair (MTTR).

This document focuses on the maintenance of the MIRAN equipment. It requires that system operates correctly before you start diagnosing the MIRAN problems.

The system installation and maintenance guide documents: *Meridian 1 general maintenance information* (553-3001-500), *Meridian 1 fault clearing* (553-3001-510), and *Meridian 1 hardware replacement* (553-3001-520) describe how to maintain the entire system. This chapter describes how to maintain the MIRAN as an integral part of the system.

Diagnostic tools

Diagnostic tools are used to troubleshoot problems in the system including problems with the MIRAN. When diagnosing MIRAN problems, you may have to use more than one of these tools.

System diagnostic tools consist of:

- LED indicators
- display codes
- card self-tests
- sanity monitoring
- overlay commands

LED indicators

System cards are equipped with red LED indicators and module power supplies are equipped with green LED indicators. These indicators show the status of each card or power supply.

MIRAN maintenance LED indicator. The MIRAN has a card LED indicator at the top of the faceplate. The card LED is a red LED that indicates the status of the card. If the LED is ON, the card may be faulty or disabled. When the card is powered up, it blinks 3 times during self-test and then is stays ON if functioning correctly, otherwise it turns ON without blinking and stays ON. The LED turns OFF when the card is software enabled.

Display codes

The MIRAN is equipped with a 4-digit alphanumeric hexadecimal display on the faceplate.

The hexadecimal display indicates the progress of the internal self-test in the form of T:xx (refer to *Appendix A, MIRAN hexadecimal codes*). Upon successful completion of the test and the start-up of the RAN application, it will display the code “**Rann**”, where **nn** is the LAN card number. If cards are not connected in a LAN configuration the display will show Ra00.

The maintenance display on the MIRAN faceplate provides detailed maintenance information. The display includes the following types of information:

- self-test results on power-up
- maintenance routine results
- upgrade and backup information
- Reading and writing to and from Drives A:, B:, or C:

Self-test

A self-test is automatically performed by each MIRAN card when you insert it into an operating system module, when you enable the card, or when you power up or reset the system. You can also perform a self-test on a card using software commands or menus.

The self-test checks general MIRAN functions and determines if they are operating correctly. It is very useful when you first install the cards because, upon insertion, the card automatically starts the self-test and gives you an immediate indication of its operating status.

Self-test performs a detail test and analysis of the installed hardware both to determine the integrity of the hardware and to establish the configuration of MIRAN card (refer to Table 28). If the detected configuration is different from that stored in the Flash memory, the difference is logged on the maintenance terminal and the Flash configuration information is updated. Results of the self-test may also be displayed on the hex display on the MIRAN faceplate.

Table 28
MIRAN self-test sequence

Item tested	Description of action
Processor/Coprocessor	Read and store processor ID. Run processor self-test.
Onboard Flash memory	Check the amount of Flash installed. Perform checksum testing of diagnostics, application, configuration areas, BIOS, and OS.
DRAM	Check the amount of DRAM installed. Perform R/W test.
PCI Chipset	Perform R/W test on selected registers.
System I/O Controller	Perform R/W test on selected registers.
PCMCIA Controller	Perform R/W test on selected registers.
DS-30X Interface	Test shared memory and perform loopback test over SD-30 LCA.
CE-MUX Interface	Test shared memory and perform loopback test over CE-MUX LCA
PCMCIA DSP card(s)	Check the presence of DSP cards and initiate diagnostic tests on DSP cards, if present.
PCMCIA Flash card(s)	Check the presence of Flash memory and the MIRAN check configuration information.

Sanity monitoring

Sanity monitoring is a background routine that checks the operation of system resources such as CPU activity memory allocation etc. This background routine attempts to restore normal system operation if the system performance has degraded to an unacceptable level. If all else fails, this routine will restart the system to try to restore it to normal operation. If the soft reset is not effective, a full board level reset is initiated. If reset is not successful, the permanent error code is displayed on the MIRAN hex display.

Overlay commands

Diagnostics are performed for every card as part of the daily routines, or may be invoked from a maintenance TTY or the SMP (when equipped). See the NTP titled *Meridian 1 system maintenance* (553-3001-520).

The MIRAN card appears as an Enhanced Universal Trunk card to a system in which it is installed. All relevant system maintenance commands for a Enhanced Universal Trunk card can therefore be used with MIRAN. Enabling and disabling of RAN channels is done in Network and Peripheral Equipment Diagnostics program LD 32. To test the music and RAN device, use the Trunk Diagnostics program LD 36.

Table 29 lists some of the commands used to control the MIRAN status and functions.

Table 29
Commands to enable/disable and test MIRAN channels

Overlay	Command	Operation performed
LD 32	DISC / ENLC	Disable / Enable specified card
LD 32	DISU / ENLU	Disable / Enable specified channel
LD 36	MUS	Test music device for specified customer and route
LD 36	RAN	Test RAN device for specified customer and route
LD 32	STAT	Get status of specified card /channel

All the above commands are handled by the MIRAN card exactly as they are by the Enhanced Universal Trunk card, transparently to the system.

MIRAN fault isolation and correction

Fault clearing procedures for the MIRAN are the same as for other IPE cards; refer to *Meridian 1 fault clearing* (553-3001-510) for more information.

Table 30 deals specifically with MIRAN service problems. To diagnose these problems, the table refers you to the test procedures in this manual that will most likely be able to resolve these problems based on the symptoms these problems are exhibiting.

Table 30
MIRAN equipment problems

Symptoms	Diagnosis	Solution
Red card LED on the MIRAN is permanently on.	Card is disabled or faulty.	Go to <i>Procedure 1</i> , in this chapter to check the card status and perform self-test.
Display on the MIRAN card shows fault codes.	Card faulty, failed self-test or problem communicating with peripheral equipment.	Go to <i>Procedures 1</i> and <i>2</i> to check self-test and self-test on reset. Also refer to <i>Hex codes in Appendix A</i> for a list of error codes. Based on the maintenance display codes description, take the appropriate action and resolve the problem.
Error messages printed on the terminal or the Meridian 1 TTY.	Hardware or software problems with the MIRAN.	Note various error messages. Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of these messages and their description. Based on the code's description, take the appropriate action to resolve the problem.

If you cannot resolve the problem after exhausting all available diagnostic tools and test procedures, make a list of all the symptoms you observed and contact your field service representative. Refer to Appendix A “Codes and interfaces” on page 177 to identify the HEX codes that indicate possible problems with the MIRAN.

Procedure 1

MIRAN self-test steps

- 1 The card will self-test.
- 2 Card LAN will poll the card.
- 3 If self-test passed, the card will send back “powered-up occurred” message.
- 4 Card LAN will request configuration data.

- 5 The card will return configuration data (card type, A07 signaling type, and TN mapping type 2).
- 6 Card LAN will enable the DS-30X signaling channel.
- 7 The MIRAN card will wait until it receives configuration data (trunk type, signaling type, balance impedance, etc.) via the DX-30X, but it will then discard this data.
- 8 The card will go into its main program loop.

Procedure 2

Reset MIRAN card command

- 1 Software will send a reset message to the card if no channels are busy.
- 2 The card will set all appropriate resources to disabled state and turn on the faceplate LED.
- 3 The MIRAN card will reset and self-test. Self-test results will be stored in case a later query is performed by the Meridian 1. Refer to hex codes in Appendix A.
- 4 Card LAN will poll the card.
- 5 If self-test passes, the card will send back a message: "power-up occurred".
- 6 Card LAN will request configuration data.
- 7 The card will return configuration data (card type, A07 signaling type, and TN mapping type 2) and enable DS-30X link.
- 8 Card LAN will enable the DS-30X signaling channel.
- 9 The card will wait until it receives download configuration data (trunk type, signaling type, balance impedance, etc.) via the DS-30X, but it will then discard this data.
- 10 The card will go to its main program loop.

MIRAN fault isolation using the menu system

Refer to "RAN Application: Terminal-based OA&M access" chapter in this manual for details on using the menu system. You will see the Main Menu when you access the terminal-based OA&M. Each option listed on the Main Menu leads to another task screen or submenu.

Main menu

To access the Main Menu, press the Enter key on your terminal. This OA&M screen presents the highest level of end-user maintenance access and provides all functions needed to configure, maintain, and upgrade the MIRAN card.

[10002345]

MAIN MENU

[NT_DISTRIB]

- 1 RAN Administration.
- 2 MIRAN Administration.
- 3 Access other MIRAN Card.
- 4 Maintenance and Diagnostics.

- 9 Logoff.

Choose a Menu Option or 9 to Exit:

MIRAN[00]>

To troubleshoot the MIRAN using the menu system, select 4 in the Main Menu and press the Enter key to display the Maintenance and Diagnostics sub-menu.

```
[10002345]                    -Maintenance and Diagnostics -                    [NT_DISTRIB]
```

- 1 System Information
- 2 Password Change
- 3 Warm Reboot
- 4 Cold Reboot

- 9 Back to Previous Menu ...

```
Choose a Menu Option or 9 to Exit:  
MIRAN[00]>
```

Card replacement

The MIRAN is based on Flash EPROM technology. This allows you to remove the MIRAN from the IPE shelf indefinitely without losing the configuration data.

To replace the MIRAN card:

- 1 Disable the MIRAN card by loading the LD 32 overlay and executing the **DISC l s c** command, where **l**= loop, **s**= shelf or module, **c**= card in the module.
- 2 Remove the card from its card slot in the IPE module.

- 3 Remove all PCMCIA cards from the faulty MIRAN card (i. e. the internal PCMCIA card and the PCMCIA cards installed into the MIRAN faceplate slots.
- 4 Transfer the Security Device from the faulty MIRAN to the replacement.
- 5 Transfer all PCMCIA cards to the new MIRAN card.

Note: This procedure moves all software, configuration, and records to the replacement MIRAN card.

- 6 Install the new MIRAN card into the IPE module card slot.
- 7 Enter the same keycode to enable the new MIRAN card.
- 8 Enable the new card by executing the **ENLC I s c** command.
- 9 Configure the newly installed MIRAN card.
- 10 Package the faulty MIRAN card and ship it to the repair center.

Appendix A: Codes and interfaces

This appendix describes a typical sound recording configuration, lists the Meridian Integrated RAN (MIRAN) hexadecimal codes that are displayed on the four-digit display on the MIRAN faceplate, and describes the external connectors and their pin assignments. The hex codes provides the status of the card during power-up and on the operational status when in service.

Sound recording configuration

The following is an example of a PC-based digital sound recording. Alternate configurations can be used that produce the 8kHz A-law or U-law PCM format output files required by the MIRAN either in .ULW or .WAV format.

Minimum PC requirements:

- 100MHz Pentium processor
- 32Mbytes of RAM
- 1Gbyte hard drive
- x4 CD ROM
- Windows 95
- Speakers

Recommended sound card:

Creative Labs AWE 32 Plug and Play audio card Model CT3601 (comes with the microphone)

PCMCIA drive:

DATABOOK ThinCard Drive Model TMB-240

Software:

GOLDWAVE sound editor.

Note: When recording announcements, use the following recommendations. To remove sharp transitions at the boundaries of an announcement, add fade-in (from 0) at the start of the message and fade-out (to 0) at the end of message. Also one second of silence must be added to the beginning and to the end of each message.

When the internal RAM test, ALU test, address mode test, boot ROM test, timer test, or external RAM test fails, the MIRAN will go into a maintenance loop and no further processing will be possible. A failure message is displayed to indicate which test failed. The message changes to **F:xx** Example; if the timer test fails, F:05 is displayed.

MIRAN hexadecimal codes

T:00	Initialization
T:01	Testing Internal RAM
T:02	Testing ALU
T:03	Testing address modes
T:04	Testing Boot ROM
T:05	Testing timers
T:06	Testing watchdog timer
T:07	Testing external RAM
T:08	Testing Host DPRAM
T:09	Testing DS30 DPRAM
T:10	Testing security device
T:11	Testing Flash memory
T:12	Programming PCIFPGA

T:13	Programming DS30 FPGA
T:14	Programming CEMUX FPGA
T:15	Programming DSP FPGA
T:16	Testing CEMUX interface
T:17	Testing EEPROM
T:18	Booting 486, waiting for response with self-test information
T:19	Waiting for application start-up message from 486
T:20	CardLan enabled, waiting for Request Config. Message
T:21	CardLan operational, A07 enabled under host control
T:22-99	Reserved for future diagnostic tests
RAnn	RAN application active and enabled for terminal OA&M (nn- MIRAN LAN card number 00-15).
RA-S	RAN application active with Set Based OA&M running. (Terminal is locked out until this clears)
W A:	Writing to A: drive. (Do not power down MIRAN or remove the drive).
W B:	Writing to B: drive. (Do not power down MIRAN or remove the drive)
W C:	Writing to C: drive. (Do not power down the MIRAN)
R A:	Reading from A: drive
R B:	Reading from B: drive
R C:	Reading from C: drive
UP00	Upgrade to onboard Flash has started (0% completed)
UPnn	Upgrade to onboard Flash in progress (nn% complete)

UPOK Upgrade to onboard Flash successfully completed

UPF Upgrade to onboard Flash failed.

When any other test fails including the EEPROM test, a message will be displayed for three seconds after the T:17 message to indicate the problem. If more than one test fails, the message displayed indicates the first fault.

MIRAN interface connectors

The interface connectors connect the MIRAN to the external equipment at the faceplate and the backplane or MDF connectors.

RS-232 ports and pinouts

Two serial ports are provided on the MIRAN board for maintenance functions. Access to both ports is over tip/ring pairs on the backplane. A permanently connected terminal should be connected at the backplane. Both ports are also accessible through the MIRAN faceplate mini-DIN connector for occasional OA&M and debugging purpose. Port B connects the terminal and port A connects to port B in a daisy-chain MIRAN configuration.

Table A-1 displays pinouts for the MIRAN faceplate mini-DIN connector.

Table A-1
Faceplate mini-DIN connector signals

Pin No.	Signal	Description
1	BDTRB-	Port B Data Terminal Ready
2	BSOUTB-	Port B Serial Data Out
3	BSINA-	Port B Serial Data In
4	SGRD	Signal Ground
5	BSINA-	Port A Serial Data In
6	BCTSA-	Port A Clear To Send
7	BSOUTA-	Port A Serial Data Out
8	BDTRA-	Port A Data Terminal Ready

Table A-2 lists the RS-232 connections at the I/O panel 50-pin connector. It lists the pins signal assignments, wire color code, and the description of the signals. Total distance from the MIRAN to the MDF and from the MDF to the terminal should not exceed 50 feet.

Table A-2
RS232 port pinouts and wire color code on the 50-pin connector

I/O Panel 50-pin connector pin assignment and wire color code	MIRAN signal name	MIRAN signal description
16 (BL-Y)	Reserved	Future use
41 (Y-BL)	BDCDA-	Port A Data Carrier Detect
17 (O-Y)	BSINA-	Port A Serial Data In
42 (Y-O)	BSOUTA-	Port A Serial Data Out
18 (G-Y)	BDTRA-	Port A Data Terminal Ready
43 (Y-G)	SGRD	Signal Ground
19 (BR-Y)	BDSRA-	Port A Data Set Ready
44 (Y-BR)	BRTSA-	Port A Request to Send
20 (s-y)	BCTSA-	Port A Clear to Send
45 (Y-S)	BSINB-	Port B Serial Data In
21 (BL-V)	BSOUTB-	Port B Serial Data Out
46 (V-BL)	BDCDB-	Port B Data Carrier Detect
22 (O-V)	BDTRB-	Port B Data Terminal Ready
47 (V-O)	BDSRB-	Port B Data Set Ready

DID configuration for telephone set-based OA&M access

To configure the system for the telephone set-based OA&M access, you must configure the DID route and trunk route data block using LD 16, LD 14, and to configure the telephone set using LD 11.

Table A-2 lists the commands to configure the DID route.

Table A-3
DID route configuration example using LD 16 (Part 1 of 2)

Prompt	Response	Prompt	Response
TYPE	RDB	TIMR	IFC 256
CUST	0		OGF 512
ROUT	89-100		EOD 13952
TYPE	RDB		LCT 256
CUST	00-0		DSI 34944
DMOD			NRD 10112
ROUT	89-100		DDL 70
DES	Set Based		ODT 4096
TKTP	DID-DID		RGV 640
M911_ANI	NO		FLH 510
NPID_TBL_NUM	0		GTO 896
SAT	NO		GTI 0
RCLS	EXT		SFB 3
DTRK	NO		IENB 5
ISDN	NO		TPD 0
PTYP	ACO		AAD 384
AUTO	NO		MAD 500
DNIS	NO		VSS 0
IANI			VGd 6
ICOG	IAO	SST	5 0
RANX	NO	DTD	NO
SRCH	LIN	SCDT	NO
TRMB	YES	2 DT	NO
STEP		NEDC	ETH
ACOD	89	FEDC	ETH
TARG	01	CPDC	NO
BILM	NO	DLTN	NO
OABS		HOLD	02 02 40
JDGT	4	SEIZ	02 02
INST		SVFL	02 02
IDC	NO	OPCB	NO
DCNO	0	DDO	NO
NDNO	0	DRNG	NO
DEXT	NO	BTUA	NO
MFC	NO	CDR	NO

Table A-3
DID route configuration example using LD 16 (Part 2 of 2)

Prompt	Response	Prompt	Response
CCD	NO	OHTD	NO
NATL	YES	PLEV	2
SSL		OPR	NO
CFWR	NO	PRDL	YES
IDOP	NO	EOS	NO
VRAT	NO	DNSZ	0
MUS	NO	RCAL	NO
MR	NO	MCTS	NO
PANS	YES	ALRM	NO
RUCS	0	BTT	30
EQAR	NO	ACKW	NO
FRL	0 0	ART	0
FRL	1 0	PECL	NO
FRL	2 0	DCTI	0
FRL	3 0	TIDY	89 89
FRL	4 0	SGRP	0
FRL	5 0	CCB	NO
FRL	6 0	CCBA	NO
FRL	7 0	CAC	3
OHQ	NO	ANDN	
OHQT	00	AACR	NO
TTEL	0		

Table A-4
DID configuration example

DID trunk configuration using LD 14		Set configuration using LD 11	
Prompt	Response	Prompt	Response
TYPE	DID	TYPE	2616
TN	3 7	TN	9 0
DATE		DATE	
DES		DES	VPS
TN	003 0 00 07	TN	009 0 00 00
TYPE	DID	TYPE	2616
CDEN	8D	CDRN	8D
CUST	0	CUST	0
XTRK	EXUT	AOM	0
FWTM	NO	FDN	
TRK	ANLG	TGAR	0
NCOS	0	LDN	NO
RTMB	89 1	NCOS	0
NITE		SGRP	0
SIGL	LDR	RNPG	0
STRI/STRO	IMM IMM	SCI	0
SUPN	NO	SSU	
CLS	UNR DTN ...	XLST	
TKID		SCPW	
DTCR	NO	SFLT	NO
DATE	27 Jan 97	CAC	3
		CLS	UNR ...
		CPND_LANG	ENG
		HUNT	
		PLEV	02
		AST	
		IAPG	0
		AACS	NO
		ITNA	NO
		DGRP	
		MLWU_LANG	0
		DNDR	0
		KEY 00 SCR	1700 0 MARP

Analog ports and pinouts

The MIRAN supports two analog input ports in order to connect external sources for recording messages and/or music, or, alternatively, to provide two analog channels that can be mapped into up to eight logical RAN units.

The 3.5 mm Audio jack provides access to a single analog input and a single analog output. On the backplane, however, two analog inputs and two cross-connect analog outputs are available for backing up stored messages onto audio cassette tape or, alternatively, for connecting to an external paging amplifier.

Table A-5 lists the 50-pin I/O panel connector pins and their signal assignment for the analog ports.

Table A-5
Analog port backplane signals

I/O Panel 50-pin connector pin assignment and wire color code	MIRAN signal name	MIRAN signal description
5 (S-W)	AGND	Analog Ground
30 (W-S)	AGND	Analog Ground
7 (O-R)	AIN0	Analog In, Port 0
32 (R-O)	AIN1	Analog In, Port 1
9 (BR-R)	AGND	Analog Ground
34 (R-BR)	AGND	Analog Ground
Note: Cross-connect audio pairs can be used to connect to external recording devices for the purpose of backing up announcements to a tape.		

MIRAN cross-connect channels

The MIRAN supports two cross-connect channels to provide connection to callers on multiple incoming lines.

Table A-6 lists the 50-pin I/O panel connector pin assignments for the MIRAN cross-connect channels.

Table A-6
MIRAN cross-connect port MDF signals

25-pair pinout and color code	Signal	Description
1 (BL-W)	RANAR0	Port 0 Audio RING
26 (W-BL)	RANAT0	Port 0 Audio TIP
2 (O-W)	RANB0	Port 0 Signaling RING to Port 0 busy (GRD)
3 (G-W)	RANAR1	Port 1 Audio RING
28 (W-G)	RANAT1	Port 1 Audio TIP
4 (BR-W)	RANB1	Port 1 Signaling RING to Port 1 busy (GRD)

MIRAN faceplate to modem cabling

Table A-7
NTAG81CA/DA modem cable RS-232 pinouts

Signal name	9-pin male (MIRAN side) Pin No.	25-pin male (Modem side) Pin No.
TX	2	2
RX	3	3
DTR	4	20
GRN	5	7

I/O panel to modem cable**Table A-8****I/O panel connector to modem cable pinouts**

Signal name	50-pin I/O panel parallel connector Pin No.	25-pin male (RS-232) (Modem side) Pin No.
TX	21	2
RX	45	3
DTR	22	20
GRN	43	7

Modem setup

To setup the modem, use a terminal connected to the modem. Set up the terminal for 9600 bps, 8 bits, 1 start, 1 stop, and no parity.

- 1** Setting the modem to auto answer
 - Connect the terminal to the modem
 - Type “AT” for a Hayes compatible modem. If the modem is connected properly, it will reply “OK”.
 - Type “ATS0=1”
 - Type “AT&W0” to save the settings.
- 2** Disable result codes.
 - Type “AT” for a Hayes compatible modem. If the modem is connected properly, it will reply “OK”.
 - Type “ATQ1”
 - Type “AT&W0” to save the settings.
- 3** Connect the modem to MIRAN using one of the cable configuration tabulated above.

Appendix B: Product integrity

This chapter presents information about MIRAN reliability, environmental specifications, and electrical regulatory standards.

Reliability

Reliability is measured by the Failure Rate (in FITS), Mean Time Between Failures (MTBF), and the Return Rate.

- **Failure Rate (FITS)** - predicted failure rate per billion hours of operation is 1168.
- **Mean Time Between Failures (MTBF)** - expected mean hours of operation between failures is 98 years.
- **Return Rate (% per year)** - expected return rate per year for the first 2 years is 1% per year.

Environment specifications

This describes the operating and storage temperature ranges and humidity for MIRAN. The ideal operating temperature is obtained when the environmental temperature is regulated using air-conditioning, however MIRAN is design to operate in the standard telephony equipment accepted temperature and humidity ranges.

Table A-9 displays acceptable temperature and humidity ranges for the MIRAN card.

Table A-9
Temperature-related specifications

Specification	Minimum	Maximum
Normal Operation		
Recommended	15° C	30° C
Relative humidity	20%	30% (non-condensing)
Absolute	10 ° C	45° C
Relative humidity	20% to	80% (non-condensing)
Rate of change	Less than 1° C per 3 minutes	
Storage		
Long Term	-20° C	60° C
Relative Humidity	5%	95% (non-condensing)
	-40° C to 70° C, non-condensing	
Short Term (less than 72 hr)	-40° C	70° C
Temperature Shock		
In 3 minutes	-40° C	25° C
In 3 minutes	70° C	25° C
	-40° to 70° C, non-condensing	

Electrical regulatory standards

The following three tables list the safety and electro-magnetic compatibility regulatory standards for the MIRAN, listed by geographic region. Specifications for the MIRAN meet or exceed the standards listed in these regulations.

Safety

Table A-10 provides a list of safety regulations met by the MIRAN, along with the type of regulation and the country/region covered by each regulation.

Table A-10
Safety regulations

Regulation Identifier	Regulatory Agency
UL 1459	Safety, United States, CALA
CSA 22.2 225	Safety, Canada
EN 41003	Safety, International Telecom
EN 70950/IEC 950	Safety, International
BAKOM SR 784.103.12/4.1/1	EMC/Safety (Switzerland)
AS3260, TS001 - TS004, TS006	Safety/Network (Australia)
JATE	Safety/Network (Japan)

Electro-magnetic compatibility (EMC)

Table A-11 lists electro-magnetic emissions regulations met by the MIRAN, along with the country's standard that lists each regulation.

Table A-11
Electro-Magnetic Emissions

Regulation Identifier	Regulatory Agency
FCC part 15 Class A	United States Radiated Emissions
CSA C108.8	Canada Radiated Emissions
EN50081-1	European Community Generic Emission Standard
EN55022/CISPR 22 CLASS B	Radiated Emissions (Basic Std.)
BAKOM SR 784.103.12/4.1/1	EMC/Safety (Switzerland)
SS-447-20-22	Sweden EMC standard
AS/NZS 3548	EMC (Australia/New Zealand)
NFC 98020	France EMC standard

Table A-12 lists electro-magnetic immunity regulations met by the MIRAN, along with the country's standard that lists each regulation.

Table A-12
Electro-Magnetic Immunity

Regulation Identifier	Regulatory Agency
CISPR 22 Sec. 20 Class B	I/O conducted noise
IEC 801-2 (level 4)	ESD (Basic Standard)
IEC 801-3 (level 2)	Radiated Immunity (Basic Standard)
IEC 801-4 (level 3)	Fast transient/Burst Immunity (Basic Standard)
IEC 801-5 (level 4, preliminary)	Surge Immunity (Basic Standard)
IEC 801-6 (preliminary)	Conducted Disturbances (Basic Standard)
BAKOM SR 784.103.12/4.1/1	EMC/Safety (Switzerland)
SS-447-20-22	Sweden EMC standard
AS/NZS 3548I	EMC (Australia/New Zealand)
NFC 98020	France EMC standard

List of Terms

ALU

Arithmetic Logic Unit.

API

Application Programming Interface. High level language software used as components in the development of an application. Also, graphics routines that perform basic graphics tasks or other functions when called by high-level application programs.

ASIC

Application-Specific Integrated Circuit. A microprocessor chip designed to do specific tasks; providing graphics capability is one such task.

ATA

AT Attachment interface. Normally used to refer to the PCMCIA version of the IDE disk drive interface found in a PC. For MIRAN, standard ATA based cards are required instead of the simpler memory based cards. The later are lower cost but require custom driver software both at the PC and MIRAN.

AUI

Autonomous/Attachment User Interface. Refers to the 15-pin, D-type connector and cables used to connect single- and multiple-channel equipment in an Ethernet transceiver.

BIOS

Basic Input/Output System. A set of permanently stored program outlines in buffers that allow software to interact with hardware components (e.g., keyboard) in a device-independent manner.

Boundary scan

Test methodology for integrated circuits that provides visibility and control of on-chip logic.

Card option

Low-end Meridian Mail platform that is packaged in the same cabinet with the Meridian 1/Option 11 switch.

CD-Rom

Compact Disk Read-Only Memory

CE-MUX

Common Equipment bus with MULTipleXed address and data.

CPE

Customer Premise Equipment. Equipment that resides on a customer's premises and is controlled by the customer as opposed to the Central Office

CPU

Central Processing Unit. A chip that performs logic, control, and arithmetic functions. The part of the switch that performs these functions and any others needed to carry out call processing.

DIN

A German Standardisation Organisation.

DS-30X

Parallel serial transmission from a superloop (XNET) card to a Controller Card in an IPE shelf.

DRAM

Dynamic Random Access Memory. A type of semi-conductor memory that is characterized by its high density (smaller packages for a given amount of memory). It typically has slower access time as compared with SRAM and requires external memory refresh circuitry.

DSP

Digital Signal Processing. A specialized computer chip that performs speedy and complex operations on digitized waveforms. Useful in processing sound and video.

DTMF

Dual Tone Multi-Frequency. A term describing push-button or touch-tone dialing.

EIDE

Enhanced IDE (see IDE below). This feature provides a significant improvement in performance over the standard IDE; it is comparable to standard SCSI in terms of throughput.

EMC

Electro-Magnetic Compatibility. Refers to equipment units that are collectively performing each of their functions without causing or suffering unacceptable degradation due to electromagnetic interference from other equipment/systems in the same environment.

EMI

(ElectroMagnetic Interference) - Unwanted electromagnetic coupling, such as a ham radio heard on an electric organ or church music heard in hearing aids. Also known as "static".

EPLD

Erasable Programmable Logic Device. An electronic device for performing logical operations that can easily be erased and reprogrammed.

ESS

Environmental Stress Screening

EST

Environmental Stress Testing.

EXUT

Enhanced Universal Trunk card. See *XUT*.

Field programmable

A program to which changes can be made while it is installed.

Firmware

Hardwired logic, software, data, and programming instructions such as that stored by threading wires through ferrite cores. May also refer to software programmed in the factory or burnt in the field, and is semipermanently stored within ROM.

Flash memory

Electrically erasable memory that is non-volatile (not affected by power disruptions).

FPGA

Field Programmable Gate Array.

Gate array

A circuit consisting of an array of logic gates (network nodes) aligned on a substrate (piece of silicon) in a regular pattern.

IDE

Integrated Drive Electronics. A low-cost hard disk drive interface.

IPE

Intelligent Peripheral Equipment - A range of cards that contain micro-processors that provide off-loading of the CPU function and the flexibility to make changes to the system's parameters without revising the hardware.

ISA

Industry Standard Architecture. A particular type of bus architecture on an IBM-DOS motherboard.

IVR

Interactive Voice Response. An application that allows telephone callers to interact with a host computer via pre-recorded messages and prompts.

Kernel

That part of a computer's operating system that performs basic functions like switching between tasks.

LCA

Logic Cell Array) - A Xilinx product that is a form of Field Programmable Gate Array. See *FPGA*.

Loader

A device that moves a program or data from a floppy or hard disk and stores it into a computer's RAM memory.

MAU

Media Access Unit. A device used to allow connection of the Ethernet AUI signals on MIRAN to an external LAN.

MDS

Modular Documentation System

MINT

Message INTerrupt. This occurs when a message being transmitted receives an interrupt signal from an outside device, which must process a task of its own. Then the transmission of the original message can resume, or be resent.

M1

Meridian 1 switch.

Mmail

Meridian Mail. Nortel's proprietary voice processing platform.

MOH

Music On Hold. Refers to telephony equipment, supplied by a Nortel switch via one or more trunk cards, to provide recorded music or radio to each caller on hold until the called party becomes available.

MTBF

Mean Time Between Failure. A measure of reliability: the time that a user may reasonably expect a device or system to work before an incapacitating fault occurs. Also, the average number of hours between one random failure and the next under stated conditions.

MTTR

Mean Time To Repair. The average time required for corrective maintenance.

NTP	Northern Telecom Publications; customer documentation. Each NTP is identified by a unique ten-digit publication number.
OA&M	Operations, Administration, and Maintenance
OEM	Original Equipment Manufacturers
PAS	Product Administration System.
PBX	Private Branch eXchange. A telephony switch that is privately owned.
PCB	Printed Circuit Board.
PCI	Peripheral Component Interconnect. An Intel device that enables high performance in an interface between a CPU bus and a peripheral device. A high-speed PC local expansion bus, capable of interconnecting ICs and plug-in boards to the host processor.
PCM	Pulse Code Modulation. A method for encoding an analog voice signal into a digital bit stream.
PCMCIA	Personal Computer Memory Card International Association. This organization has defined a credit card sized plug-in board for use in PCs. These cards are the only way to get to a laptop bus without using a docking station. In addition, application software can be stored on the card into system address space so that the software can run directly from the card, resulting in a faster start and less memory required from the host computer.

PRS

Problem Reporting System. A procedure followed by Nortel when customers (internal or external) find an error and file a Problem Report form with a committee that manages the PR System. The committee determines who should receive the report, and then this individual or team must "clear the PR" by describing or demonstrating how the problem was addressed.

RAN

Recorded ANnouncement trunks - A trunk that provides a link between the PBX and a recorded announcement device, used to provide recorded information to callers.

RTC

Real Time Clock. System clocking influenced/determined by connection to a time process external to processing by the system.

SBC

Sub-Band Coding. Algorithm used by Meridian Mail for compressing speech data down to just over a quarter of its original size.

Scalable architecture

A way of designing a system that allows it to be resized with relative ease; the cost required to increase its size in proportion to the new size.

SDI

Serial Data Interface. For some Meridian switches, provides ports between the CPU and external devices like a teletype or maintenance telephone. More generally, an SDI is a mechanism for changing the parallel arrangement of data within computers to the serial form used on transmission lines, and vice versa.

SL-1

Generic term given to Nortel digital switches. Meridian 1 refers specifically to the current series of Nortel PBX's

SMP

System Management Project/Product. An OA&M GUI interface to Nortel switches now being developed.

- STA** Single Terminal Access.
- VxWorks** Wind River RTOS (Real Time Operating System). See RTOS.
- .WAV** File format used for storing voice files created under Microsoft Windows.

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Meridian 1

Meridian Integrated RAN (International)

Description, installation, and
operation

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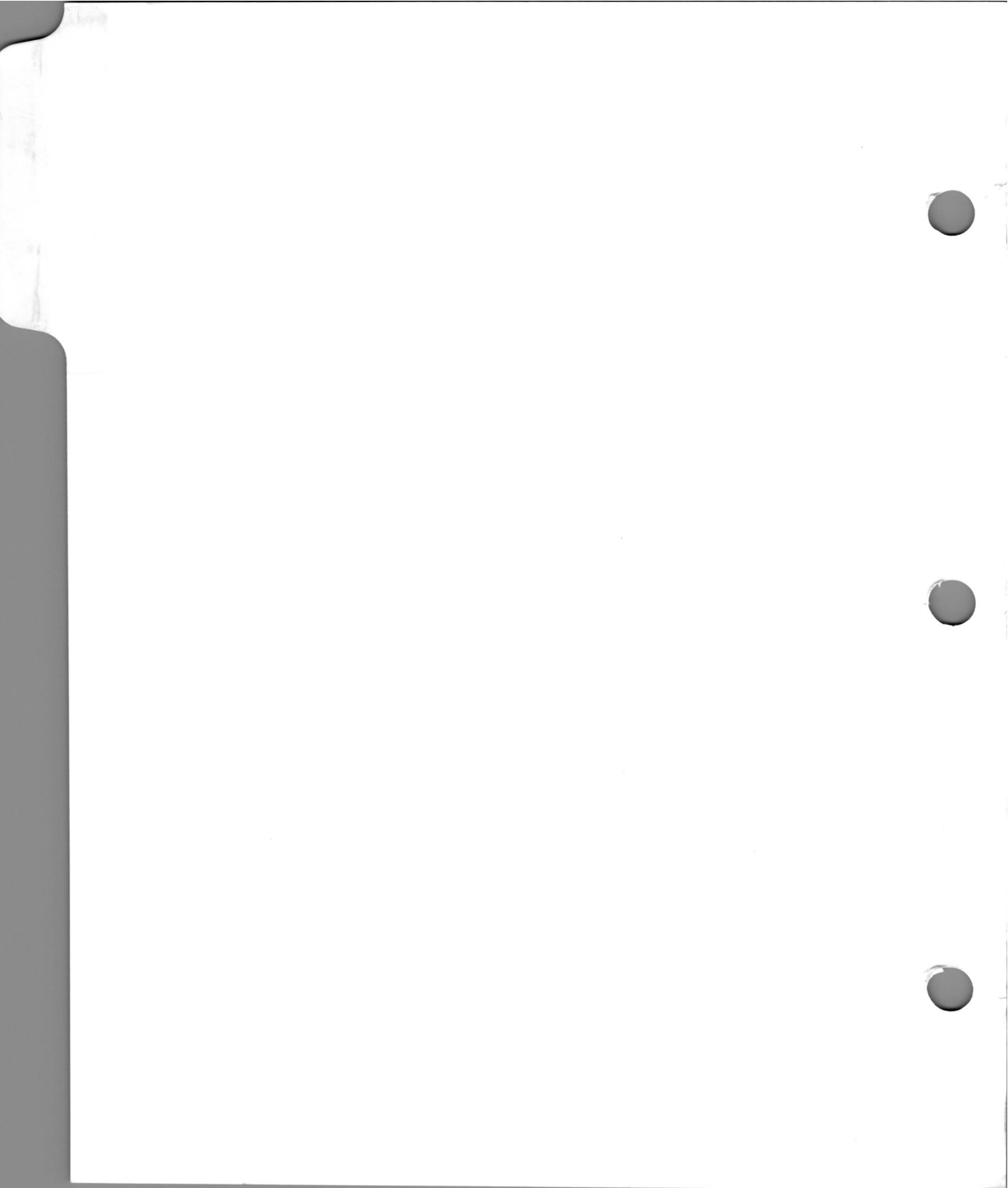
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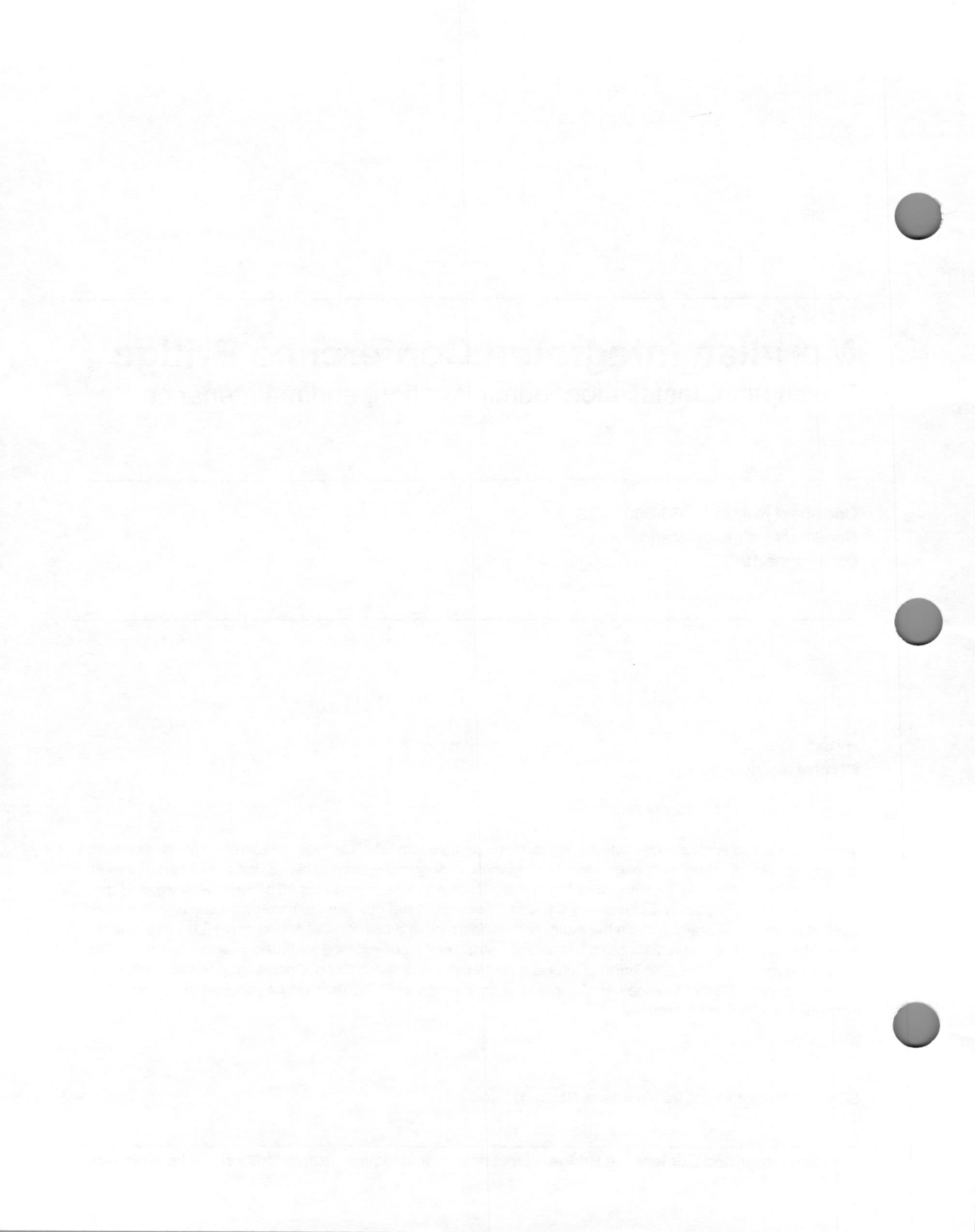
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About this document

This document provides information about the implementation of the Meridian Integrated Conference Bridge (MICB) in the Meridian 1 system. It describes the MICB operation, installation, configuration, administration, applications, and maintenance.

It focuses on the application and administration of the MICB for scheduling and configuring multiple simultaneous conferences over a single MICB card.

The purpose of this document is to instruct the user how to install, configure, operate, and maintain the Meridian Integrated Conference Bridge (MICB) as a part of the overall Meridian 1 system.

The following describes what you will find in this document:

Product description describes the MICB functional and physical characteristics.

Installation and configuration describes how to prepare the Meridian 1 equipment, how to install the MICB into the Intelligent Peripheral Equipment (IPE) module, how to connect it to the administration terminal, and how to configure the MICB using the system TTY.

Administration describes the MICB administration procedures, MICB parameter configuration, conference scheduling, conference administration and maintenance, and report generation.

Maintenance describes how to perform maintenance functions and how to troubleshoot the MICB card and the associated equipment.

Appendix A lists the MICB pin assignment and connector types for external connections to the MICB.

Appendix B describes reliability, environmental specifications, product integrity, and regulatory standards for the MICB.

Description

This chapter describes the NT5D51 Meridian Integrated Conference Bridge (MICB) card, both at a system level and at a card level. It describes functions, specifications, applications, engineering guidelines, and operation of the MICB card.

System overview

The MICB is an Intelligent Peripheral Equipment (IPE) card compatible with Meridian 1 options 21E, 51, 51C, 61, 61C, 71, 81, and 81C. It is also compatible with Option 11E/11C system and SL-1 systems NT and XT upgraded to support IPE cards.

The system software required to support all 32 MICB ports is X11 release 22 or later. System software releases X11 releases 19 through 21 support only a maximum of 16 ports. The system software must contain the automatic call distribution (ACD) features and routing software modules to support the MICB operation. The ACD resources should be taken into account in the incremental software management (ISM) of the customer configuration, where each MICB port represents an ACD agent that uses up a DN and a TN from the system resources.

The MICB communicates with X11 system software by emulating a digital line card, which allows the use of the existing software to control the MICB operation. Each MICB port is defined as an automatic call distribution (ACD) ACD agent. All MICB ports are members of an ACD group controlled by an Control DN.

The organization, administration, and management (OA&M) of the MICB card is provided over a terminal or a personal computer using a terminal emulating software. The terminal is connected to the MICB card through the IPE module I/O panel.

The Conference/TDS card is not used in any application with the MICB card.

The terminal can be used by the operator who deals with conference management and the administrator who has additional responsibility such as; system and global conference attributes editing, bridge allocation, control directory numbers and event script editing, and audio recording.

The MICB card has two PCMCIA sockets. PCMCIA hard drive cards are used to store in memory the MICB voice prompts and firmware code. The MICB is shipped with the PCMCIA hard drive. The bottom socket is used to house the PCMCIA hard drive card that contains the current firmware and customer data and the top socket is used for upgrading the firmware.

Multiple MICB cards can be installed into the system, however each card operates as an independent unit and it is not connected to other MICB cards in the system.

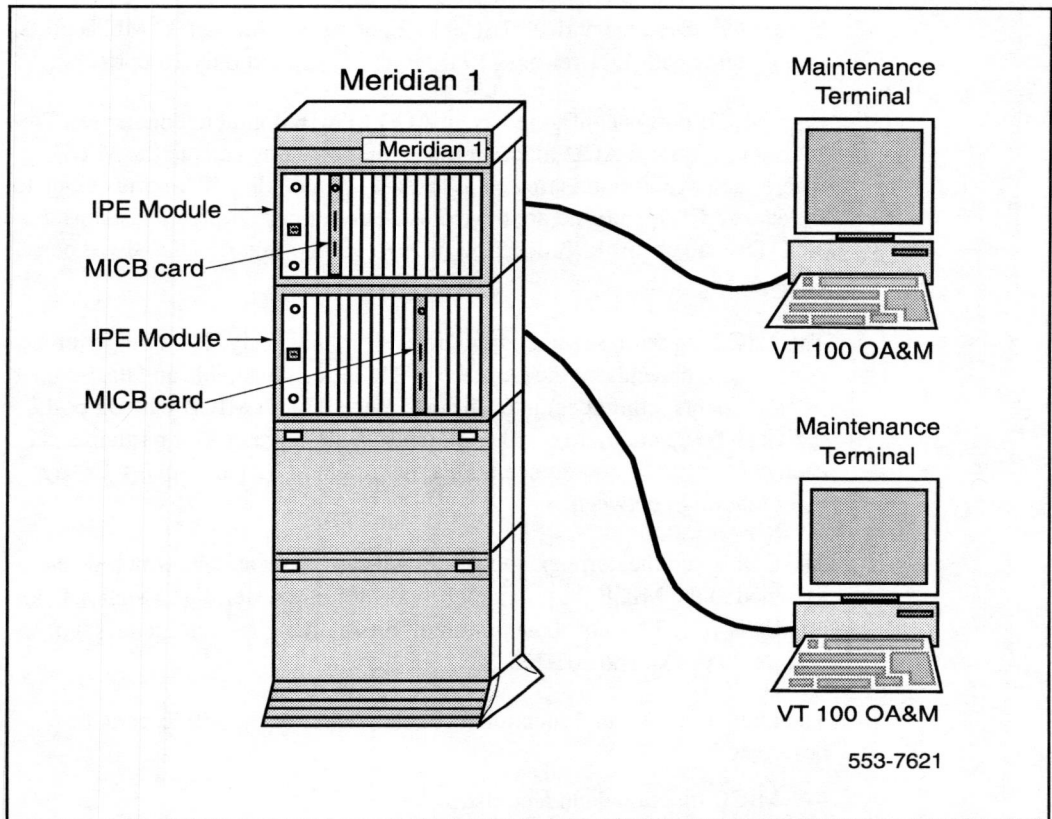
To conduct conference administration and maintenance for that MICB card, you have to connect the terminal to the RS-232 port or the Ethernet connector associated with that MICB card. Each maintenance terminal is connected to each MICB card through an IPE module I/O panel connector or through the Ethernet adapter card.

The Ethernet adapter provides two options:

- Direct terminal connection or modem connection to DB-9 connector
- Ethernet connection, where multiple terminals connected to the Ethernet can access an MICB card

Figure 1 shows Meridian 1 with two IPE modules. This example shows each IPE module with one MICB card and each MICB card is connected to its own maintenance terminal through the associated IPE module I/O panel connector. You can use one terminal for all MICB cards (one at the time) by moving the terminal cable to the I/O panel connector of the MICB card you wish to access.

Figure 1
MICB card in the Meridian 1 system



MICB description

The NT5D51 Meridian Integrated Conference Bridge (MICB) card can be installed into any IPE card slot that is associated with full 50-pin I/O cables. For specific information of the possible IPE card slots where the MICB can be installed, refer to Table 2 “MICB installation card slots in different PE modules” on page 25.

The MICB card provides up to 32 ports that can be partitioned into groups from 1 to 10 where each group represents an independent conference.

Note: Systems with X11 release 22 or higher, support 32 MICB ports, systems with X11 releases 19 through 21, support only 16 ports.

Each MICB port is configured as an ACD M2616 digital telephone set. The Meridian 1 system ACD function routes the incoming calls to the MICB, where each MICB port is treated as an ACD agent. All MICB ports belong to the same ACD queue and are treated as a pool of ports with equal status. For ACD DN and Control DN description, refer to “Configuring the MICB ports” on page 18.

The MICB supports several conferences simultaneously. The number of conferences depends on the number of MICB ports available and the number of participants (conferees) in each conference. For an MICB with 32 ports, there can be a maximum of 10 conferences with three or four participants in each conference, 1 conference with a maximum of 32 participants, or any combination in between.

The CDNs and the corresponding TNs are system resources, which when assigned to the MICB ports cannot be used for other Meridian 1 stations. For an MICB with 32 ports, a maximum of 10 simultaneous conferences would require 20 CDNs and 20 TNs.

The main hardware and functional characteristics of the MICB card are described in:

- MICB functional characteristics
- MICB hardware design characteristics

MICB functional characteristics

The function of the MICB card is to schedule and administer multiple simultaneous conferences. These conferences are scheduled based on time-of-day, duration of each conference, and number of conferees or ports allocated for each conference.

It provides pre-programmed announcements and tones that correspond to specific events during conferences to advise the chairperson and other conferees of the status of the conference connection, indication when a conferee joins or leaves the conference, warns the chairperson and the conferees when the scheduled conference time is about to expire, etc.

System compatibility features:

- compatible with the IPE module in any system that supports IPE
- emulates a digital telephone set, such as M2616, on each MICB port
- supports both the A-law and the μ -law signal coding/decoding
- provides full duplex communication
- supports DTMF detection
- provides system reporting

Features supported through the MICB DSP firmware:

- selects two active speakers in a conference of up to 32 conferees
 - analyzes the loudness of all received signals continuously and selects the two loudest signals to be the two active speakers
 - the two speakers are not selected globally, but based on the signal strength associated with each timeslot.
- handles 2-way conversation in conferences with 2 to up to 32 conferees
- supports a maximum of 10 simultaneous conferences
- normalizes the PCM input samples
- handles both A-law and μ -law companding
- provides gain control on all output samples

MICB expansion options:

- software upgrade using the PCMCIA Flash card
- port expansion by providing keycode selectable options of 12, 16, 24, or 32 ports

MICB conference features:

- provides for one or more permanent bridge configurations
- supports multiple conferences simultaneously
- allows conference extension beyond the scheduled time
- allow number of conferee expansion if MICB ports are available
- supports up to five different languages on each PCMCIA hard drive
- provides conference security (password option)
- automatically starts and terminates conferences based on reservations scheduled in advance
- issues 10-minute warning before the conference termination
- support of dial-in conference
- provides conference entry and exit tones or messages
- allows conference music turn off for the first conferee joining the conference
- controls access to the conference in progress by monitoring the maximum number of scheduled attendees at each conference
- manages time and date for scheduled conferences, reserves ports for each conference, and prevents overbooking of ports
- provides recorded announcements and tones to ports and conferences by playing pre-recorded files stored on the PCMCIA hard drive card
- supports brand line greeting (a customized greeting for each language)
- supports administration features such as; system configuration, scheduling, management, and report generation
- routes conferees to the appropriate conference based on the dialed directory number (CDN)

- issues audible responses to conferees based on the conference activity
- provides conference traffic report

Chairperson's features:

- provides for one chairperson per conference
- allows conference music turn off if the chairperson is first to join the conference (or turn on the music if the music is off)
- allows the chairperson to dial *0# to get assistance
- allows chairperson's access and command execution such as; dial-out, drop conferees, count conferees, and lock/unlock conference

MICB hardware design characteristics

An MICB card occupies one IPE slot in an IPE module.

The MICB card has the following hardware interface characteristics:

- uses the MPU based on the 25MHz MC68EN360 Integrated Communications Controller
- uses standard interface buses and PCMCIA cards and handles MS-DOS compatible file on the PCMCIA storage device
- accesses all 32 DS-30X voice/signaling timeslots
- provides echo cancelling
- supports automatic gain control
- supports Card-LAN interfaces
- Performs X12 signaling protocol messages for input/output
- Uses Digital Signal Processor (DSP) for conferencing and DTMF detection
- Provides self-test of internal hardware components and allows card monitoring and maintenance through the maintenance port
- Provides one RS-232 serial port for administration and maintenance access
- provides optional Ethernet interface over the MMI

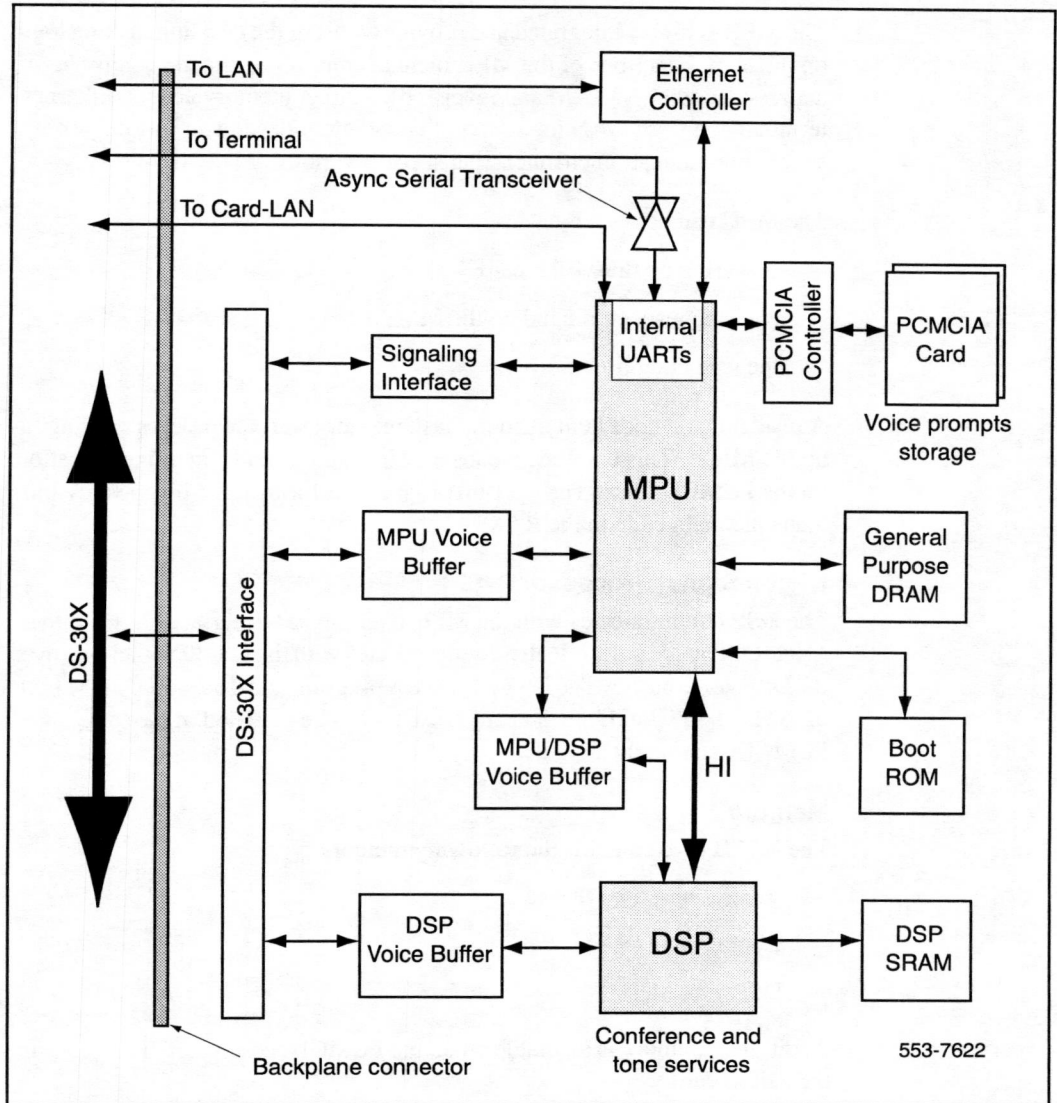
Table 1 describes each hardware component provided for the MICB application. These components are used to connect the MICB to the maintenance terminal locally and remotely.

Table 1
MICB hardware list

Component	Description
NT5D51 MICB Card	An IPE card that provides bridge and conference scheduling for up to 10 simultaneous conferences. (The NT5D51 MICB card, the Security Device, and the NT5D62 PCMCIA hard drive card, all together are packaged as NT5D32).
NT5D62 PCMCIA Hard Drive Card	This PCMCIA card contains the MICB software and configuration. It must be installed into the lower PCMCIA drive for the MICB to operate.
NT5D52AA Ethernet Adapter card (for IPE module installation)	This adapter card is installed on the IPE module I/O panel only if the MICB is to be connected to the Ethernet.
NT5D52BA Ethernet Adapter card (for Option 11C/11E installation)	This adapter card is installed into the Option 11C/11E tip/ring connector only if the MICB is to be connected to the Ethernet.
NT5D19AA Maintenance cable	This cable is used to connect the terminal to the 50-pin tip/ring connector on the IPE module I/O panel or the Option 11C or 11E tip/ring connector. This cable requires a nullmodem for proper connection to the MMI terminal.
A0601396 Nullmodem	Compact DB-25F/DB-25M nullmodem adapter.
A0601397 Nullmodem	Compact DB-25F/DB-25F nullmodem adapter.
A0601464 Nullmodem Maintenance cable	This cable has a DB-9 female and a DB-25 male connectors and it is used to connect the terminal to the MICB using the Ethernet Adapter card DB-9 male connector. No additional nullmodem is required.

Figure 2 shows a high level block diagram of the MICB card components. It also shows the MICB interfaces at the IPE module backplane connector.

Figure 2
MICB block diagram



Micro Processing Unit (MPU)

The MPU coordinates and controls data transfer and addressing of the peripheral devices. Tasks that the MPU performs depend on the interrupts it receives. These interrupts are prioritized by the importance of the tasks they control.

The MPU is highly integrated and provides most of the decision making logic on the chip. Functions of the MPU include controllers, timers, control logic, address decoding, DRAM and independent direct memory access, Ethernet terminal and Card-LAN input/output ports, and independent full-duplex serial communication channels that support various protocols.

The MPU can be reset by:

- powering up the MICB card
- entering reset command on the MMI
- the watchdog timer

A resident boot code contained in Flash memory start the process of bringing up the MICB. This boot code loads a start-up program from a fixed location on the PCMCIA disk. The start-up program performs basic diagnostics and loads the main code to the RAM.

Digital Signal Processor (DSP)

The DSP communicates with the MPU over the host interface (HI) and the MPU-DSP voice buffer. It also communicates with the DS-30X interface over the DSP voice buffer. The DSP can access program and data stored in the DSP SRAM. The PCMCIA Flash card must always be installed in the low PCMCIA slot on the MICB.

Memory

The MICB card contains the following memory types:

- general purpose DRAM.
- Boot ROM.
- DSP SRAM.

Additional memory is available when the PCMCIA card(s) are installed into the MICB card.

Card-LAN interface

To implement the Card-LAN interface, the MICB card uses an internal UART device. The UART channel is a serial communication interface to Peripheral Controller card.

The Card-LAN is a 19.2 kbps asynchronous interface. It is used to poll and communicate with the Peripheral Controller card to transmit maintenance messages, which include:

- LED control of the IPE card enable/disable
- MICB card configuration
- MICB card type and version information

DS-30X

A DS-30X network loop is composed of two synchronous serial data buses that transport data:

- One bus transmits data toward the line facility (Tx)
- The other bus receives data toward the Meridian 1 CPU (Rx)

DS-30Y network loops extend between controller cards and superloop network cards, and function similarly to DS-30X loops. Essentially, a DS-30Y loop carries the PCM timeslot traffic of a DS-30X loop, but up to four DS-30Y loops form a **superloop** with a capacity of 128 channels (120 usable timeslots).

RS-232 port

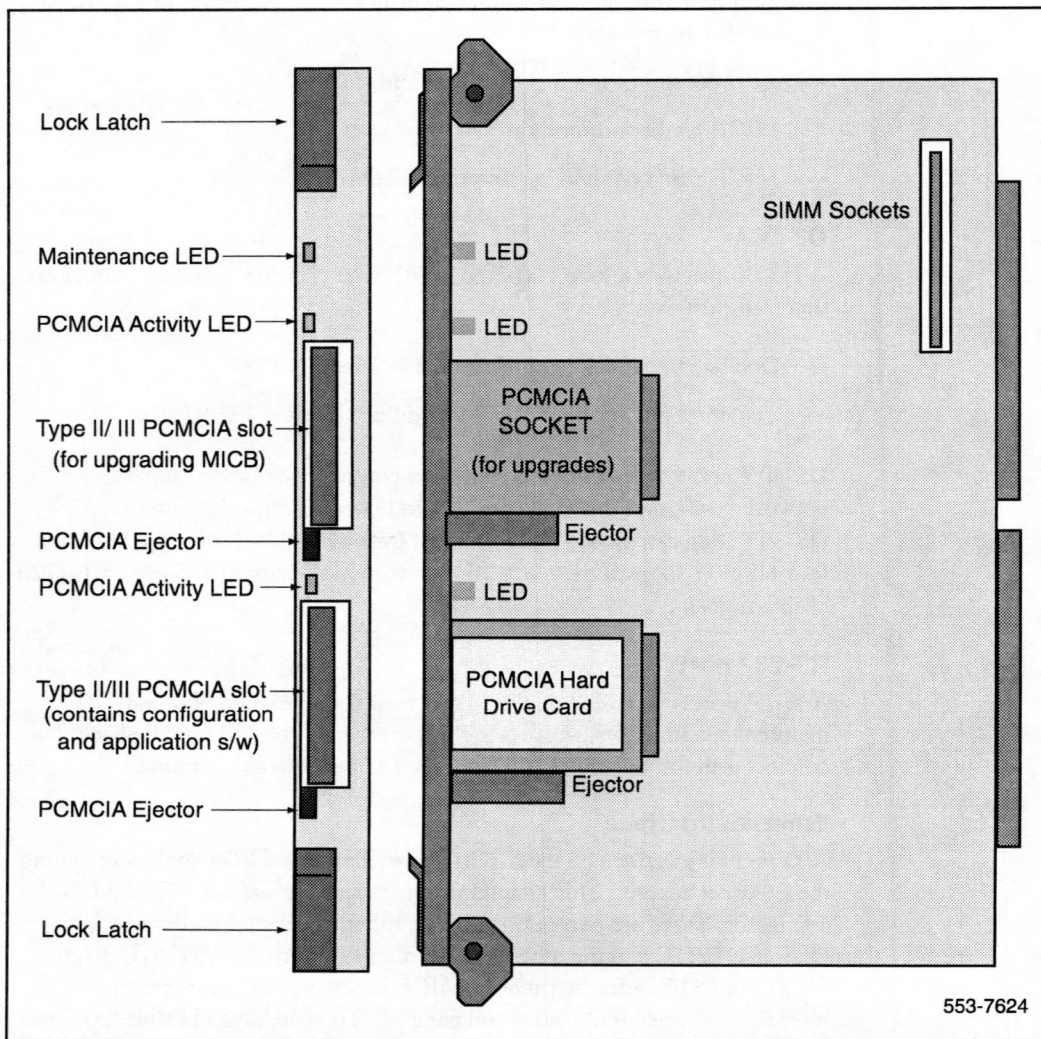
A serial port is provided on the MICB card for administration and maintenance functions. Access to this port is over the IPE module backplane connector to the I/O panel and from the I/O panel to the terminal.

Ethernet interface

An Ethernet interface on the MICB is provided at the I/O panel by installing the Ethernet adapter. This adapter provides an Ethernet RJ-45 and a DB-9 connector. There are two options of the Ethernet adapter cards; one for Option 11E/11C and the other for Meridian 1 options 21E, 51, 51C, 61, 61C, 71, 81, and 81C, refer to Table 1 “MICB hardware list” on page 10. Also, refer to “Ethernet application” on page 30. You can have multiple terminals on the network be able to access the MICB card.

Figure 3 illustrates the component side of the MICB card and the faceplate. The component side shows the DRAM and the PCMCIA socket locations. The faceplate shows the card LED and the PCMCIA activity LED indicators and the slot locations for PCMCIA cards.

Figure 3
NT5D51 MICB card



Faceplate sockets and indicators

The MICB faceplate provides:

Card LED. The MICB faceplate provides a red card LED to indicate the enabled/disabled status of the card and to indicate the self-testing result during power up or card insertion into an operating system. This LED indicates the following:

- LED is ON when the MICB card is disabled
- LED is OFF when the MICB card is enabled and ready for use
- LED is BLINKING three times and stays ON (until is software enabled) when the MICB card has successfully completed self-test

PCMCIA activity indicator LEDs. These LEDs are next to the PCMCIA slots and indicate the following:

- LED is ON when the PCMCIA card is disabled
- LED is OFF when the PCMCIA card is enabled and ready for use
- LED is BLINKING when the PCMCIA card is in use

Type II/III PCMCIA slots. The MICB faceplate provides two Type II/III PCMCIA card slots. These slots are use to house the PCMCIA cards. The lower slot is used to install the PCMCIA hard drive card that stores voice prompts and firmware code. The upper slot is used for upgrading the firmware, when required.

MICB operation

The MICB card continuously monitors the audio signal level received from each conferee and selects the two loudest signals for transmission. The two loudest signals are summed and inserted into the PCM sample prior to their transmission to other conferees. This implementation of the two loudest signals improves the interrupting capability of a conference connection and allows normal two way conversation that all conferees can hear.

In addition to the conferee timeslots, the MICB provides a timeslot between the MPU and the DSP. This timeslot transmits message prompts and/or entry and exit tones that are broadcasted to all conferees when requested by the MPU.

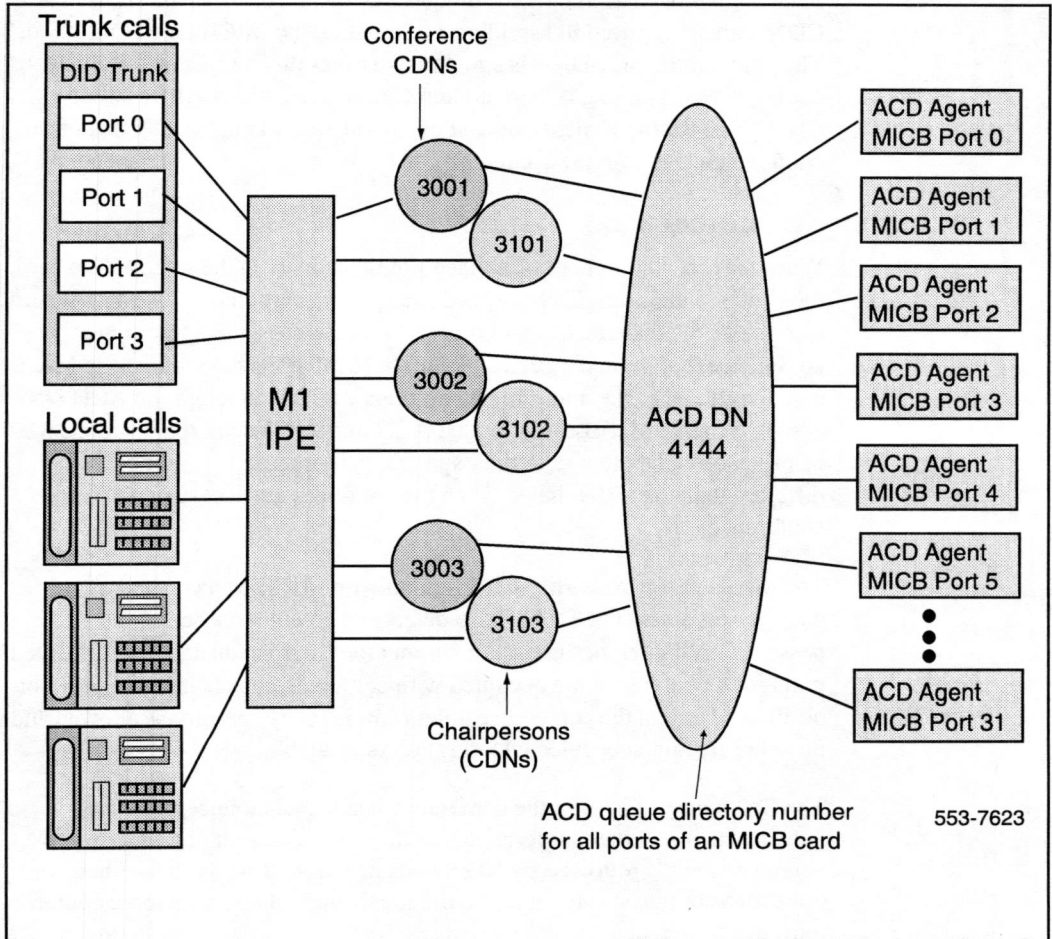
The MICB card uses the system ACD features to schedule multiple simultaneous conferences, to route external incoming trunk and local line conferees to their appropriate conferences, to provide queuing, chairperson feature, and events reporting for each conference activities on an MICB card.

The ACD features used by the MICB card provide:

- expanded number of ports in the same pool allowing up to 1200 ACD agents for Meridian 1 systems and up to 120 for the Option 11E/11C system
- Meridian 1 options 21E through 81C support 240 CDNs or ACD DN's
- Option 11E/11C supports 100 CDNs or ACD DN's
- simple software configuration
- queuing of incoming calls, announcement on arrival, call management, and reporting
- operational statistics reports
- enhanced call routing

Figure 4 illustrates the call routing for three conferences. It shows the conference chairperson access control directory number (CDN) for each conference and the ACD DN for the ACD queue that controls the path of all ports on an MICB card. The right-hand-side of the figure shows the distribution of MICB ports as ACD agents.

Figure 4
Call routing with chairperson access



Configuring the MICB ports

Ports on the MICB card are configured as ACD digital sets, where each port is considered to be an ACD agent. All ports on an MICB card belong to an ACD queue (group). This ACD queue is identified with an ACD directory number (ACD DN) that handles the connection of conferees (ACD agents) to the appropriate conference Control Directory Number (CDN), which represents the specific conference.

Each conference has assigned a unique CDN and a chairperson CDN. The CDN's are configured in Meridian 1 at the time the MICB card is installed. The total number of CDN's is equal to two times the number of simultaneous conferences. Example, if there are ten conferences, there will be twenty CDN's one for the chairperson and one regular conference CDN that each conferee dials to join the conference.

Joining the conference

When several conferences take place simultaneously in the same MICB card, the conferee dials the CDN assigned to a specific conference. The MICB card recognizes the dialed CDN and routes the conferee to the appropriate conference represented by that specific CDN. All ports belonging to an MICB card are routed to the appropriate conference (CDN) through the ACD DN assigned to that MICB card i. e. that ACD queue. The chairperson dials the chairpersons CDN to access their specific conference. This number is different than the CDN dialed when the conferees are accessing that same conference.

The MICB performs DTMF detection only on MICB ports tagged as chairperson ports. The DTMF also detects when conferees enter the password. A conference may start without the chairperson and if all allocated ports for a conference are occupied with conferees, the chairperson will not be allowed to join the conference unless conference expansion is allowed and there are free un-scheduled (floating) ports available.

The first conferee joining the conference hears an announcement that indicates that no other conferee joined the conference yet and this announcement is followed by 60 seconds of music. This announcement with 60 seconds of music is repeated continuously until at least one more conferee joins the conference.

The MICB provides flexibility in configuring conferences. They can be configured as:

- pre-scheduled conference with fixed number of ports, fixed start and stop times
- pre-scheduled elastic conference with variable number of ports where they are added when required (if available) and subtracted as people leave the conference
- permanent bridge with fixed number of ports that can be used without pre-scheduling the conference

Expanding the conference

Conference expansion may be allowed or denied by using an administration command. This feature is enabled during the conference scheduling. If enabled, the number of conferees belonging to a conference can be expanded as long as there are a sufficient number of the remaining MICB ports to satisfy other simultaneous pre-scheduled conferences.

When reserving the MICB ports for each simultaneous conference, specific ports are not tagged for a specific conference. The MICB counts the number of reserved ports and compares them against the total number of ports provided by the MICB card and makes sure that the reserved ports do not exceed the total number of ports provided by the MICB card.

If additional (not scheduled) callers attempt to join a conference, but they are not allowed due to lack of floating ports or locked conference, the MICB card will issue an overflow tone and then disconnect the call.

If un-scheduled (floating) ports are released from a conference, they are immediately available to be used by conferees of other conferences if the expansion feature is enabled.

The minimum duration of a conference is 15 minutes and the maximum duration of a time-limited conference is 12 hours. Scheduled conference starting time and conference duration is incremented in steps of 5 minutes.

Ending the conference

When the conference was scheduled, the conference number of ports, start time, and duration were specified. The conference will end at the predetermined time, which is based on the start time and conference duration. Ten minutes before the end of the conference, the MICB card issues an announcement warning the conferees that the conference will terminate in 10 minutes.

When the conference time is up, the MICB card issues to conferees the final warning and it also send the release message to Meridian 1 for all the associated MICB ports. These ports now become available for the next pre-scheduled conference, or if not scheduled, they become floating ports not reserved for any other conference and can be used to expand conferences in progress if the conference expansion feature is enabled.

Individual conferees may leave a conference in progress at any time. The MICB detects a conferee leaving the conference, and exit prefix announcement is inserted in the conference and the conferee's name is announced, if this feature is enabled. When only one conferee is connected to the conference, an announcement is issued indicating that only one conferee is present followed by 60 seconds of music. This announcement and the music is repeated continuously until at least one more conferee joins in, or the conference is terminated.

Note: A conference may begin and end two minutes before the specified time. This feature allows the system to close all terminating conferences two minutes earlier and start all conferences that should be started immediately after the terminating conferences are closed. This feature is important when terminating and starting conferences use some common CDNs.

Chairperson's function

The chairperson can control conference activities by executing commands on his/her telephone set. These commands consist of an asterisk (*) followed by one or two digits. If a star (*) is dialed only, after 5 seconds the command times out. If 2 stars are dialed (**), the command is aborted. These commands control the following functions:

Dial-out

The chairperson can dial out and call a new party outside of the conference with the intention to only confer with the party, or to include the party into the conference. To do this the chairperson dials *0DN# to dial a party outside the conference, or *0 to access the operator. The chairperson can then decide to bring the party into the conference by executing the *2 command or disconnect the call by executing the *3 command. If you dial the wrong number, you can dial *3 and re-dial. To redial the last number dialed, the chairperson dials *#.

The port for dialing out is selected by the MICB card and is available if the number of ports reserved for the conference is greater than the number of conferees that have joined the conference. The port may also be available if all the reserved ports are occupied for that conference, but there are some un-reserved ports available on the MICB card and the port expansion feature is enabled for that conference. If all reserved ports are occupied and there are no unscheduled ports available, the call will not be completed.

Note: When the chairperson dials out, two ports are seized, the dial-out port of the local MICB and the dial-in port of the remote MICB. This connection can be terminated only if the chairperson drops the dial-out port of the local MICB.

Drop all conferees

The chairperson can drop all conferees from the conference except the chairperson by executing the *90 command. No announcement is issued to the conference before disconnecting the conferees if the chairperson is still connected. The chairperson is the only one still connected. The MICB card issues an announcement indicating that no other conferees are connected to the conference followed by 60 seconds of music. This announcement with 60 seconds of music is repeated continuously until at least one conferee joins the conference or the conference is terminated.

Drop last dialed conferee

The chairperson can remove the last conferee that dialed in or was included into the conference by the chairperson dialing out and including the called party into the conference. To drop the last conferee joining the conference by dialing out, the chairpersons executes the *91 command, to drop the last conferee that joined the conference by dialing in, the chairperson executes the *92 command.

Count conferees

The chairperson can count the number of conferees that joined the conference by executing the *6 command. The MICB card issues a string of voice prompts one for each conferee in the conference. If a new conferee joined the conference after the command was invoked, that new conferee will not be counted.

When you dial *6 the conferees will hear a faint click when the * is dialed.

Lock or unlock the conference

The chairperson can lock the conference to prevent any new conferees from joining the conference by executing the *4 command, or can unlock the conference by executing the *5 command and allow new conferees to join the conference. A caller attempting to join a locked conference hear an announcement indicating that the conference is locked and the connection is dropped. The chairperson can dial-out and include a conferee even if the conference is locked.

The chairperson trying to lock or unlocked the conference will hear normal confirmation tone as if the command was executed.

MICB capacity expansion

The MICB card can be configured to provide a maximum of 12, 16, 24, or 32 ports. To activate a different number of ports than currently active, you must access the General Administration commands **Functionality Upgrade** menu and select **Modify** to change the maximum number of ports to be activated, and then **Save** to save the changes.

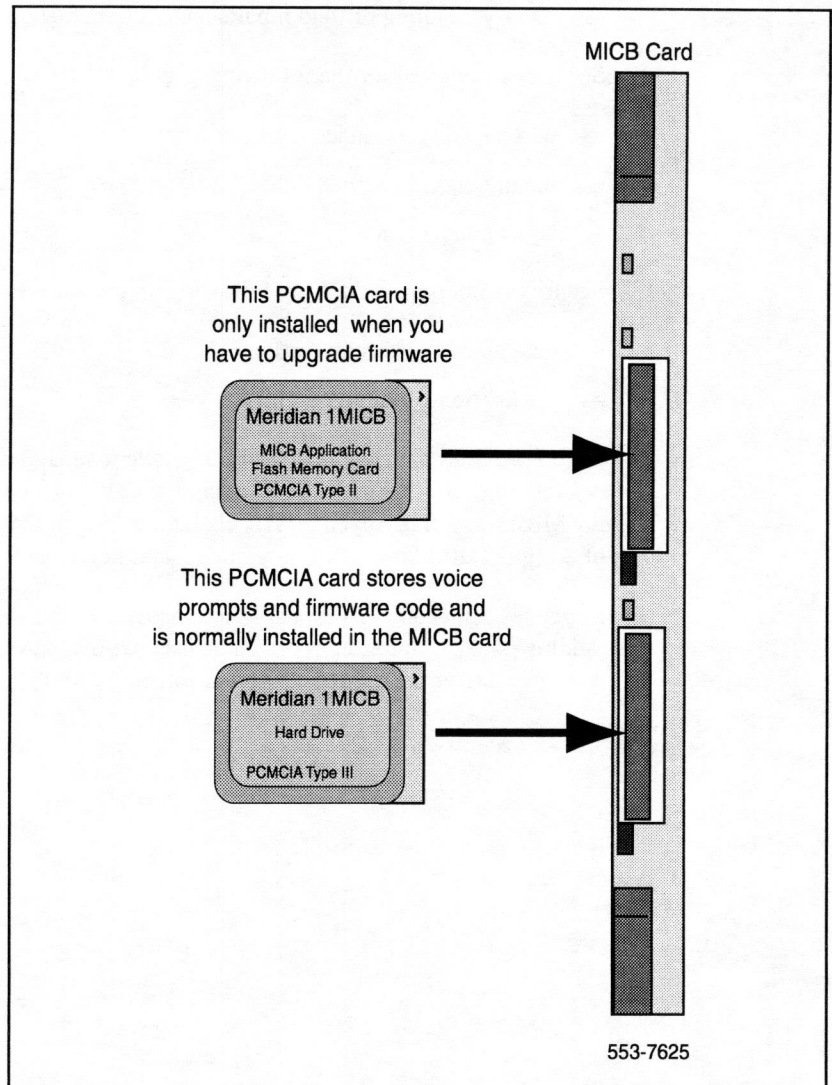
After the changes were saved, you must enter the correct keycode that will allow the changes to be activated. The keycode is 24 characters long entered in three sets of 8 digits called key-code1, key-code2, and key-code3. Refer to the Administration chapter of this document for details.

External memory expansion, new voice announcements, and firmware upgrade can be accomplished by inserting a PCMCIA card into the top PCMCIA slot accessible through the MICB faceplate.

The available storage for voice prompts on the PCMCIA disk is 130 Mbytes, providing 260 minutes of voice recording. The MICB uses the PCMCIA ATA, Type II and Type Flash cards for MICB software upgrade and backup.

Figure 5 illustrates how PCMCIA cards are loaded into the MICB faceplate slots to upgrade the MICB capacity.

Figure 5
Installing a PCMCIA card into the MICB faceplate slot



Security

A keycode is implemented to protect against unlawful MICB feature usage, because industry-standard PCMCIA cards are used as the software medium on the MICB. All upgrades of either port capacity or application software are restricted to a given MICB card and are accurately tracked to allow for satisfactory handling of field repairs and incremental upgrades.

Security is required for the following upgrades:

- port capacity upgrades
- feature enhancements
- new applications

Security is not required for the following upgrades:

- backup and restore operations
- application patching/bug fix

Nortel provides the customer with a keycode to enable them to install any desired upgrade. The keycode is entered over the local maintenance port on the MICB card. The keycode is 24 characters long and is entered in three sets of 8 digits called key-code1, key-code2, and key-code3.

Keycodes can enable additional functionality within an existing application (adding ports, features, etc.) or can be used with a PCMCIA card to provide new software or pre-recorded announcements.

Engineering guidelines

Meridian 1 general system engineering guidelines are described in **Meridian 1 system engineering** (553-3001-151). The following information deals specifically with engineering guidelines for the MICB planning and implementation. For system integrity and standards, refer to “Appendix B: Product integrity” on page 119.

System compatibility

Each MICB port is emulating a digital set assigned to an ACD agent. All ports on an MICB card belong to an ACD queue, which is controlled by the ACD DN assigned to that specific MICB card.

To support a maximum of 32 ports, the Meridian 1 system must be running on X11 release 22 or later software. Software X11 release 19, 20, and 21 supports a maximum of 16 ports. Starting with X11 release 22, the software provided for flexible voice and data TN feature allowing configuration of up to 32 ports.

The MICB is supported by:

- Meridian 1 options 21E, 51, 51C, 61, 61C, 71, 81, and 81C
- SL-1 systems NT and XT upgraded to support IPE cards
- Option 11E, 11C

Table 2 lists the Meridian 1 modules and the card slots suitable for MICB installation. The MICB card may be installed in to the following IPE card slots:

Table 2
MICB installation card slots in different PE modules

Meridian 1 modules	MICB card slots
NT8D37BA/EC IPE modules, NT8D11BC/ED CE/PE modules	All available IPE card slots.
NT8D37AA/DC IPE modules	0, 4, 8, and 12
NT8D11AC/DC CE/PE modules	0

System resources

The system ACD resources should be taken into account. Incremental Software Management (ISM) for the specific Meridian 1 system option must be reviewed. Each MICB port represents an ACD agent that uses up a DN and a TN from the total system resources. A maximum of 20 DNs (CDNs) are required for each MICB. These resources must be decremented from the overall system resources.

These resources must be subtracted from the overall system resources and cannot be used for any other application as long as they are assigned for MICB use. Refer to "Engineering multiple simultaneous conferences", on the next page, for the system resource allocation.

Required software packages

In addition to the standard X11 release software, the system must be equipped with the following software packages to allow the MICB card to operate as intended:

- ACD basic package (45)
- ACD advanced features (41)
- Enhanced ACD routing (214)
- Digital set (88)
- End-to-end signaling (10) - required if chairperson calls locally within the same switch

Engineering multiple simultaneous conferences

The MICB card can be configured to provide a maximum of 12, 16, 24, or 32 ports. To activate the selected number of maximum ports, a keycode consisting of 24 digits is required. Refer to the MICB administration chapter of this document for details.

For the list of MICB features and functions, refer to "MICB functional characteristics" on page 7.

To provide multiple simultaneous conferences on one MICB card, the following system resources must be specified:

- 1 Activate the maximum number of MICB ports required for your site. If the current number of active ports is sufficient to meet the requirements or if all 32 ports are enabled, skip this step.
- 2 Assign one ACD DN (automatic call distribution directory number including its queue and data block). One ACD DN is required for each MICB card.
- 3 Specify CDNs (control directory numbers) and their data blocks. All CDNs should be accessible by DID trunks. To determine the number of CDNs:
 - Determine the maximum number of simultaneous conferences on the MICB card.
 - Multiply the number of conferences by 2 to determine the number of CDNs required (each conference requires 2 CDNs - one for the chairperson and one that conferees call to access the conference). Example: 10 simultaneous conferences require 20 CDNs.
- 4 Assign DNs (directory numbers) and corresponding digital set data blocks. Each configured MICB port appears as a digital set of an ACD agent. The number of DNs is equal to the maximum number of ports provided by the MICB card. For an MICB with 32 ports active, you require 32 telephone set (agent) DNs and the corresponding 32 TNs.

Environmental and power requirements

The environmental requirements for the MICB must meet or exceed the overall Meridian 1 system requirements. The power provided for each card slot in the IPE module exceeds the power requirements for an MICB.

Environmental requirements

Table 3 shows the operating and storage environmental specifications. Ideally the system should operate in a stable environment at 22° C (72° F). However, the system is designed to operate in the temperature and humidity ranges specified in Table 3.

Table 3
Environmental requirements

Condition	Environmental specifications
Operating	
Temperature	0° to 50° C (32° to 122° F)
Relative humidity	5% to 95% noncondensing
Altitude	3,048 meters (10,000 feet) max
Storage	
Temperature	–50° to 70° C (–58° to 158° F)
Relative humidity	5% to 95% noncondensing

Power requirements

Power to the MICB is provided by the IPE module power supply (AC or DC). Refer to Table 4 for a display of the MICB power requirements and also to the Meridian 1 power engineering (553-3001-152).

Table 4
MICB power requirements

Voltage	Source	Current
+5 V	Backplane	3.0 A
+15 V	Backplane	0.25 A
Total maximum power		18.75 W

The maximum IPE module per slot power budget is 30 Watts, with an effective limitation of 20 Watts for thermal compensation. The MICB card does not exceed the power allocated for each card slot in the IPE module.

Table 5 lists the transmit and receive analog signal levels as measured at the transmitter output and receiver input in the MICB card.

Table 5
Voice signal level specifications

Signal Direction	Minimum Power	Maximum Power
Transmit signal	-55 dBm0	0 dBm0
Receive signal	-55 dBm0	0 dBm0
<i>Note:</i> For others signal characteristics, refer to Summary of transmission parameters (553-2201-182)		

External equipment

To perform OA&M sessions you must connect a terminal or a PC emulating a terminal to the MICB card.

VT100 type terminal

A VT100 terminal or a personal computer emulating a terminal is used to perform MICB administration, configuration, and maintenance and diagnostics.

The terminal must be connected to the MICB RS-232 interface. The terminal can be connected as follows:

Direct connections:

- directly to the IPE module I/O panel or Option 11 C/E 50-pin connector
- directly to the DB-9 connector on the NT5D52 Ethernet Adapter card installed on the I/O panel

Remote connections:

- to the IPE module I/O panel or Option 11 C/E 50-pin connector through a modem connection

- to the RJ45 jack on the NT5D52 Ethernet Adapter card to the Ethernet for remote multi-terminal access to the MICB

Terminal interface must be set at 9600 baud, 8 data bits, 1 stop bit, and no parity. The flow control is hard wired (never use XON/XOFF flow control).

Ethernet application

Ethernet implementation over the MICB has the following characteristics:

- The MICB Ethernet connection is separated from the external LAN traffic by a firewall.
- The Ethernet Adapter options for MICB are:
 - NT5D52AA for the IPE module application
 - NT5D52BA for the Option 11E/11C application
- The Ethernet provider assigns the IP address for the MICB. The IP address is entered over the MMI terminal.
- To access the MICB over the Ethernet, the terminal or a PC must emulate a VT100 terminal.

Installation and configuration

This chapter describes the installation of the Meridian Integrated Conference Bridge (MICB) card. It describes how to install the MICB and how to connect it to a terminal for OA&M access. It also describes the basic MICB card configuration procedures.

Quick reference to MICB installation and configuration

If you are familiar with the MICB operation and general Meridian 1 installation practices, follow the steps below to speed up the installation of the MICB and its external connections:

- 1 Take inventory of the MICB equipment by comparing the received equipment against the shipping documents.
- 2 Identify the card slot(s) in the IPE module or Option 11C or 11E cabinet where to install the MICB card(s).
- 3 If you are planning to utilize an Ethernet interface, install the NT5D52AA Ethernet Adapter card onto the IPE module I/O panel or the NT5D52BA into Option 11C/11E tip/ring connector cutout. Refer to “Installing the Ethernet Adapter card” on page 35.
- 4 Install the MICB card(s) in the designated card slot(s). For available card slot locations, refer to Table 2 “MICB installation card slots in different PE modules” on page 25.
- 5 Connect the maintenance terminal to the MICB.
 - Refer to “Connecting the terminal to an MICB card in the IPE module” on page 36 and select the appropriate connection option based on your requirements.
 - Refer to “Connecting the terminal to Option 11E or 11C cabinet” on page 42 and select the appropriate connection option.

- 6 Configure the MMI terminal interface parameters. Refer to “Configuring the MMI terminal for OA&M access” on page 50.
- 7 Configure the MICB card(s) using the system TTY. Refer to “MICB configuration” on page 46.
- 8 Login as an administrator and enter the keycode, if not already entered.
 - Refer to “User login” on page 55 and
 - Refer to “Functionality Upgrade” on page 83 for keycode entry.
- 9 Verify that the PCMCIA hard drive is installed and properly seated.
- 10 Clear the initial screen from any dummy conference scheduling that might have been left in from MICB factory or lab testing. To do this:
 - Refer to “Bridge Allocator” on page 65 to delete bridge data.
 - Refer to “Conference Reservation” on page 86 to delete a conference scheduled for the future, or
 - Refer to “Meeting Terminate” on page 95 to delete a currently active conference.
- 11 Specify CDNs to be used by the MICB for conference scheduling. Refer to:
 - Specify system DNs as CDNs using the system TTY and overlay LD 23 as described in “Defining CDN data blocks” on page 48.
 - Assign these CDNs to conference using the “CDN Editor” on page 64.
- 12 If you are using ACD scheduled data blocks, then the agent IDs must be defined in the MICB system attributes menu as described in “System Attribute Editor” on page 61. Note that the agents IDs must be consecutive numbers within the lower and upper limit starting with the number assigned to the first agent ID.
- 13 If you are connected to the Ethernet, obtain the IP address for the MICB from the network provider and enter the IP address using the “System Attribute Editor” on page 61.
- 14 Proceed with the Main Menu in the MICB administration chapter to schedule conferences, establish bridges, and perform administration tasks.

Installation overview

The MICB service can be added to existing Meridian 1 system options 21E, 51, 51C, 61, 61C, 71, 81, and 81C as well as Option 11E/11C and SL-1 systems that supports IPE cards, originally installed and operating without MICB, or it can be an integral part of a newly installed Meridian 1 system.

The MICB can be installed into:

- A previously installed Meridian 1 system upgraded to run on generic software X11 release 22 or higher to be able to support all 32 MICB ports, or X11 release 19 to 21 that support a maximum of only 16 MICB ports
- A newly installed system using the latest generic X11 software

To install a new Meridian 1 system or expand an existing one, refer to **Meridian 1 system installation procedures** (553-3001-210). It provides the information on how to install, verify, and maintain the Meridian 1 system.

To complete the installation of an MICB card, you should follow the general procedures listed below.

These procedures include:

- Preparing the site
- Unpacking, inspecting, and taking inventory of the equipment
- Installing the MICB card in the selected IPE card slot, if not already installed
- Installing the cables between the maintenance terminal and the IPE module I/O panel connector at the rear of the module

Installation preparation

The preparation consists of unpacking and inspecting components, taking inventory, and locating the IPE card slots where the MICB will be installed.

Unpacking and inspection

Unpack and inspect the equipment for damage. When unpacking, follow general precautions recommended by computer and telephone equipment manufacturers:

- Remove items that generate static charge from the installation site.
- Use antistatic spray if the site is carpeted.
- Ground yourself before handling any equipment.
- Remove equipment carefully from its packaging.
- Visually inspect the equipment for obvious faults or damage. Any damaged component must be reported to your sales representative and the carrier who delivered the equipment.

Taking inventory

After the equipment has been unpacked and visually inspected, verify that all the equipment is at the site before the installation begins. Equipment received must be checked against the shipping documents. Any shortages must be noted and reported to your sales representative.

MICB equipment installation

The installation of the MICB card and the external equipment connections associated with the MICB should start after:

- verifying that the preinstallation preparation has been completed (this includes verifying that all the equipment has been received undamaged)
- planning you MICB equipment, port configuration, and external equipmentconnectionconfigurationusingEngineeringguidelines inthe Description section of this document

Installing the Ethernet Adapter card

You do not have to install the Ethernet Adapter card unless you wish to connect the MICB to the Ethernet for multi-terminal access to the MICB.

To install the Ethernet Adapter card on to Option 11C/11E tip/ring connector:

- 1 Identify the 50-pin tip/ring connector at the bottom of the cabinet, which corresponds to the card slot position where the MICB will be installed.
- 2 Plug the 50-pin connector on the NT5D52BA Ethernet Adapter card into the 50-pin tip/ring connector on the Option 11C/11E cabinet.
- 3 Secure the Ethernet Adapter to the cabinet.

To install the Ethernet Adapter card on the IPE module I/O panel:

- 1 Remove the cover plate from the I/O panel at the rear of the IPE module.
- 2 Lift the I/O panel from the module by removing all the retaining screws.
- 3 Disconnect the backplane cable 50-pin connector from the I/O panel filter connector.
- 4 Remove the existing filter connector from the I/O panel and save the retaining screws. This filter connector corresponds to the card slot designated for the MICB card installation.
- 5 Install the NT5D52AA Ethernet Adapter card into the designated I/O panel connector cutout using the saved retaining screws.
- 6 Secure the I/O panel onto the module using the retaining screws previously removed. Replace the module's cover plate.

Installing MICB cards

When installing MICB cards, follow the steps bellow:

- 1 Identify the IPE card slots selected for MICB card(s). Refer to Table 2 "MICB installation card slots in different PE modules" on page 25.
- 2 Pull the top and bottom extractors away from the MICB faceplate.
- 3 Insert the MICB card into the card guides and gently push it until it makes contact with the backplane connector.

- 4 Push the top and the bottom extractors firmly towards the faceplate to insert the MICB card into the faceplate connector and to lock it firmly in place.
- 5 Ensure that the PCMCIA hard drive card is properly seated in the lower faceplate PCMCIA slot.
- 6 Observe the red LED at the top of the faceplate (the card LED). This LED should blink three times after the self-test is successfully completed and then stay ON until the MICB is software enabled.
- 7 Repeat steps 1 through 6 for each additional MICB card.

Connecting the terminal to an MICB card in the IPE module

The MICB terminal may be connected locally using a direct cable connection or remotely using a modem connection to provide OA&M access to the MICB card. The terminal can be connected to the MICB as a:

- local and direct connection from the I/O panel 50-pin connector using a cable and a nullmodem
- remote connection from the I/O panel 50-pin connector using a cable and a modem for remote access to the MICB
- local connection through the Ethernet Adapter card DB-9 connector using a cable and a nullmodem
- remote connection through the Ethernet Adapter card DB-9 connector using a cable and a modem for remote access
- remote multi-terminal access through the Ethernet Adapter card RJ-45 jack and a RJ45 modular cable to the Ethernet hub

Local and direct terminal connection

This connection is established from the I/O panel 50-pin connector through a cable and a nullmodem to the terminal. Refer to Figure 6 for details.

- 1 Position the terminal on a desk near the system.
- 2 Plug the NT5D19AA cable 50-pin female connector into the 50-pin tip/ring connector on the I/O panel at the rear of the IPE module, which corresponds to the MICB card slot.

- 3 Plug the NT5D19AA cable DB-25 male connector into the DB-25 female connector of the A0601396 DB-25F/DB-25M nullmodem adapter. (If you require a female-to-female nullmodem, use A0601397 nullmodem).
- 4 Plug the DB-25 male connector of the A0601396 DB-25F/DB-25M nullmodem adapter into the terminal RS-232 connector. (If you require a female-to-female nullmodem, use A0601397 nullmodem).

Note: Refer to Connector pin assignments in Appendix A for details about the NT5D19AA cable pin assignments.

Remote terminal connection using a modem

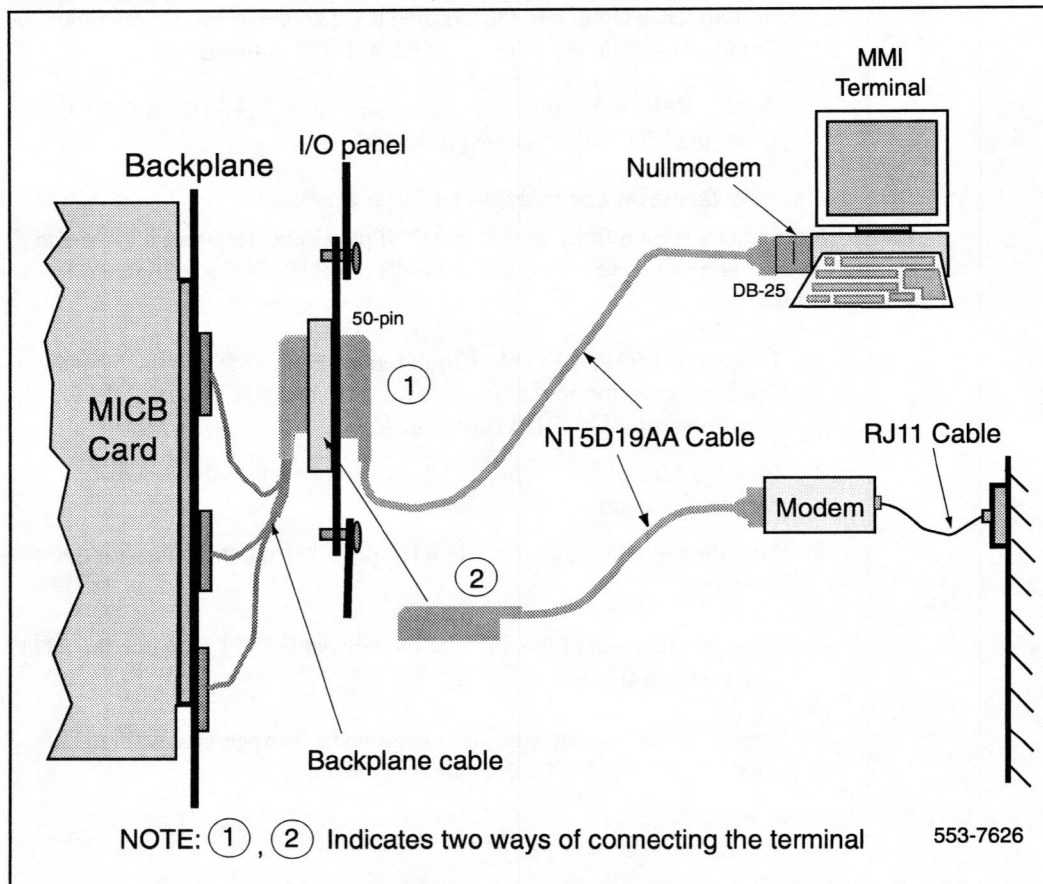
Remote connection from the I/O panel 50-pin connector using a cable and a modem allows you to access to the MICB remotely. Refer to Figure 6 for details.

- 1 Plug the NT5D19AA cable 50-pin female connector into the 50-pin tip/ring connector on the I/O panel at the rear of the IPE module, which corresponds to the MICB card slot.
- 2 Plug the NT5D19AA cable DB-25 male connector into the DB-25 female connector on the modem.
- 3 Plug the modular modem cable RJ11 plug into the RJ11 jack on the modem.
- 4 Plug the other end of the modular modem cable RJ11 plug into the RJ11 jack on the wall.

Note: Refer to Connector pin assignments in Appendix A for details about the NT5D19AA cable pin assignments.

Figure 6 illustrates two ways of connecting the MICB terminal. These are, the local direct connection or the modem connection to the 50-pin connector on the I/O panel.

Figure 6
Terminal connection to the IPE module I/O panel 50-pin connector



Direct terminal connection through Ethernet Adapter

To connect a local terminal through the NT5D52AA Ethernet Adapter card, connect the Ethernet Adapter DB-9 connector to the terminal using a direct cable. Refer to Figure 7 for the connection illustration.

- 1 Position the terminal on a desk near the system.
- 2 Verify that the Ethernet Adapter card has been installed onto the I/O panel as described in "Installing the Ethernet Adapter card" on page 35.
- 3 Plug the A0601464 terminal cable DB-9 female connector into the DB-9 male connector on the Ethernet Adapter card on the I/O panel.
- 4 Plug the DB-25 male connector at the other end of the A0601464 terminal cable, into the RS-232 connector on the terminal. (No nullmodem is required). If a gender changer is required, you may be able to obtain it at your local electronics store.

Remote terminal connection using Ethernet Adapter and modem

Remote terminal connection can be established by connecting the DB-9 Ethernet Adapter connector through a modem to a distant terminal. Refer to Figure 7 for the connection illustration.

- 1 Verify that the Ethernet Adapter card has been installed onto the I/O panel as described in "Installing the Ethernet Adapter card" on page 35.
- 2 Plug the A0601464 terminal cable DB-9 female connector into the DB-9 male connector on the Ethernet Adapter card on the I/O panel.
- 3 Plug the DB-25 male connector at the other end of the A0601464 terminal cable into the DB-25 female connector of the A0601396 DB-25F/DB-25M nullmodem adapter. (If you require a female-to-female nullmodem, use A0601397 nullmodem).
- 4 Plug the DB-25 male connector of the nullmodem adapter A0601396 DB-25F/DB-25M into the DB-25 female connector on the modem. (If you require a female-to-female nullmodem, use A0601397 nullmodem).
- 5 Plug the modular modem cable RJ11 plug into the RJ11 jack on the modem.
- 6 Plug the other end of the modular modem cable RJ11 plug into the RJ11 jack on the wall.

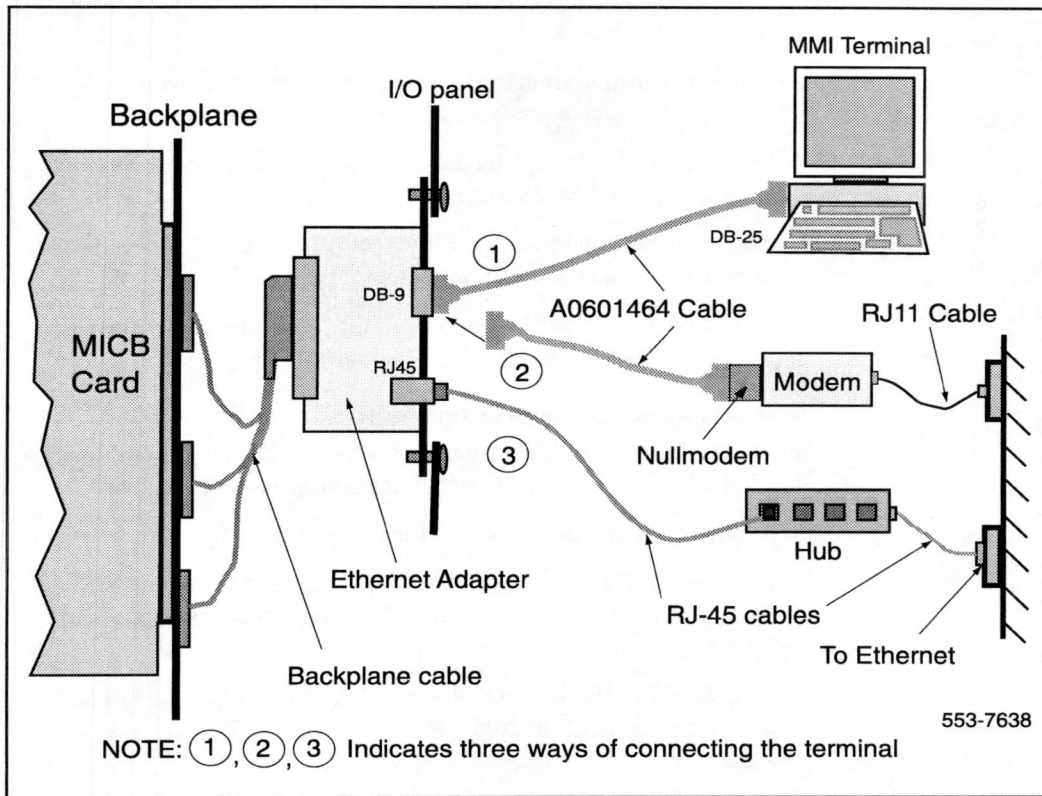
Remote multi-terminal connection through Ethernet

The MICB card can be accessed from one or more terminals from the Ethernet, if the MICB card is connected to the Ethernet through the NT5D52AA Ethernet Adapter card. Figure 7 for the connection illustration.

- 1** Verify that the Ethernet Adapter card has been installed onto the I/O panel as described in "Installing the Ethernet Adapter card" on page 35.
- 2** Plug the modular cable RJ-45 plug into the RJ-45 jack on the NT5D52AA Ethernet Adapter card.
- 3** Plug the RJ-45 plug at the other end of the modular cable, into the Ethernet hub.
- 4** Make the rest of the Ethernet connections as required using standard Ethernet connection rules.

Figure 7 illustrates the I/O connector bracket connection to the MICB, the terminal, and the Ethernet.

Figure 7
Terminal connection through the Ethernet Adapter



Connecting the terminal to Option 11E or 11C cabinet

The MICB terminal may be connected locally using a direct cable connection or remotely using a modem connection to provide OA&M access to the MICB card. The terminal can be connected to the MICB as a:

- local and direct connection from the tip/ring 50-pin connector using a cable and a nullmodem
- remote connection from the tip/ring 50-pin connector using a cable and a modem for remote access to the MICB
- local connection through the Ethernet Adapter card DB-9 connector using a cable and a nullmodem
- remote connection through the Ethernet Adapter card DB-9 connector using a cable and a modem for remote access
- remote multi-terminal access through the Ethernet Adapter card RJ-45 jack and a RJ45 modular cable to the Ethernet hub

Local and direct terminal connection

This connection is established from the tip/ring 50-pin connector through a cable and a nullmodem to the terminal. Refer to Figure 6 for details.

- 1 Position the terminal on a desk near the system.
- 2 Plug the NT5D19AA cable 50-pin female connector into the 50-pin tip/ring connector on the Option 11C or 11E, which corresponds to the MICB card slot.
- 3 Plug the NT5D19AA cable DB-25 male connector into the DB-25 female connector of the A0601396 DB-25F/DB-25M nullmodem adapter.
- 4 Plug the DB-25 male connector of the A0601396 DB-25F/DB-25M nullmodem adapter into the terminal RS-232 connector. If a gender changer or a different nullmodem adapter is required, you may be able to obtain it in your local electronics store.

Note: Refer to Connector pin assignments in Appendix A for details about the NT5D19AA cable pin assignments.

Remote terminal connection using a modem

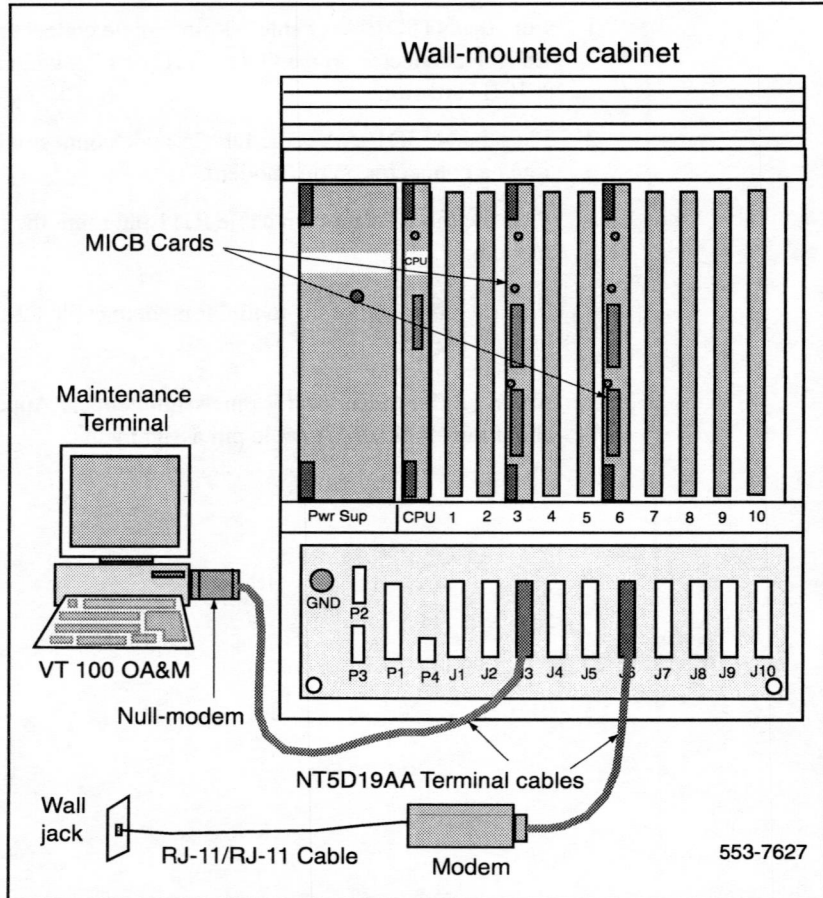
Remote connection from the tip/ring 50-pin connector using a cable and a modem allows you to access to the MICB remotely. Refer to Figure 6 for details.

- 1** Plug the NT5D19AA cable 50-pin female connector into the 50-pin tip/ring connector on the Option 11C or 11E, which corresponds to the MICB card slot.
- 2** Plug the NT5D19AA cable DB-25 male connector into the DB-25 female connector on the modem.
- 3** Plug the modular modem cable RJ11 plug into the RJ11 jack on the modem.
- 4** Plug the other end of the modular modem cable RJ11 plug into the RJ11 jack on the wall.

Note: Refer to Connector pin assignments in Appendix A for details about the NT5D19AA cable pin assignments.

Figure 8 shows the wall-mounted cabinet and the terminal connected to the 50-pin tip/ring connector at the bottom of the cabinet.

Figure 8
Maintenance terminal connection to the wall-mounted cabinet



Direct terminal connection through Ethernet Adapter

To connect a local terminal through the NT5D52BA Ethernet Adapter card on the Option 11C or 11E, connect the Ethernet Adapter DB-9 connector to the terminal using a direct cable. Refer to Figure 7 “Terminal connection through the Ethernet Adapter” on page 41 for the connection illustration.

- 1 Position the terminal on a desk near the system.
- 2 Verify that the NT5D52BA Ethernet Adapter card has been installed onto the Option 11C or 11E.
- 3 Plug the A0601464 terminal cable DB-9 female connector into the DB-9 male connector on the Ethernet Adapter card on the I/O panel.
- 4 Plug the DB-25 male connector at the other end of the A0601464 terminal cable, into the RS-232 connector on the terminal. (No nullmodem is required). If a gender changer is required, you may be able to obtain it at your local electronics store.

Remote terminal connection using Ethernet Adapter and modem

Remote terminal connection to the Option 11C or 11E can be established by connecting the DB-9 Ethernet Adapter connector through a modem to a distant terminal. Refer to Figure 7 “Terminal connection through the Ethernet Adapter” on page 41 for the connection illustration.

- 1 Verify that the NT5D52BA Ethernet Adapter card has been installed onto the Option 11C or 11E system.
- 2 Plug the A0601464 terminal cable DB-9 female connector into the DB-9 male connector on the Ethernet Adapter card on the I/O panel.
- 3 Plug the DB-25 male connector at the other end of the A0601464 terminal cable into the DB-25 female connector of the A0601396 DB-25F/DB-25M nullmodem adapter. (If you require a female-to-female nullmodem, use A0601397 nullmodem).
- 4 Plug the DB-25 male connector of the nullmodem adapter A0601396 DB-25F/DB-25M into the DB-25 female connector on the modem. (If you require a female-to-female nullmodem, use A0601397 nullmodem).
- 5 Plug the modular cable RJ11 plug into the RJ11 jack on the modem.
- 6 Plug the other end of the modular modem cable RJ11 plug into the RJ11 jack on the wall.

Remote multi-terminal connection through Ethernet

The MICB card on the Option 11C or 11E can be accessed from one or more terminals from the Ethernet, if the MICB card is connected to the Ethernet through the NT5D52AA Ethernet Adapter card. Refer to Figure 7 "Terminal connection through the Ethernet Adapter" on page 41 for the connection illustration.

- 1 Verify that the NT5D52BA Ethernet Adapter card has been installed into the Option 11C or 11E.
- 2 Plug the modular cable RJ-45 plug into the RJ-45 jack on the Ethernet Adapter card.
- 3 Plug the RJ-45 plug at the other end of the modular cable, into the Ethernet hub.
- 4 Make the rest of the Ethernet connections as required using standard Ethernet connection rules.

MICB configuration

Now that you installed the MICB card(s) and connected the terminal, you can proceed with MICB card configuration.

Configuring MICB using the system TTY

To configure an MICB card:

- 1 Define CDN blocks, respecting the above restrictions. The default ACD DN in all CDN blocks of an MICB card should be the ACD DN defined in the ACD block.
- 2 Define each MICB port as a digital telephone set M2616. MICB ports are defined as ACD agents in the ACD data block. The digital set keys should be defined as follows:
 - Key 0 - ACD
 - Key 1 - Single Call Ringing (SCR) with a dedicated DN
 - Key 2 - Not Ready (NRD)
 - Key 3 - Make Set Busy (MSB)

Agent IDs must be defined in the MICB system attributes menu as consecutive numbers within the lower and upper limit. Refer to “System Attribute Editor” on page 61.

Defining the ACD data block

To configure the ACD data block, load LD 23 using the system TTY and enter the appropriate responses to the prompts as listed in Table 6.

Table 6
Defines an ACD data block

Prompt	Response	Description
REQ	NEW	New control data block
TYPE	SBC or ADS	To print ACD report scheduling data block To print auxiliary data system data block (This allows you to select an available block of number to be used as agent IDs within the upper and lower limit of the numbers block.)
TYPE	ACD	ACD data block
CUST	0-99	Customer number
ACDN	<ACDDN>	ACD directory number
MAXP	32	Maximum number of ACD agent positions

Defining CDN data blocks

This defines the control DN assigned to each conference and each chairperson associated with each conference.

Table 7 shows the CDN data block configuration using the Automatic Call Distribution (ACD) program LD 23.

Table 7
Configuring the MICB Control DNs using LD 23

Prompt	Response	Description
REQ	NEW	New control data block
TYPE	CDN	Control DN data block
CUST	0-99	Customer number
CDN	<CDN#>	Control directory number
DFDN	<ACDDN>	Local ACD DN
<i>Note:</i> Repeat commands in this table for each CDN you wish to configure, up to the required number of CDNs.		

Note: The number of CDNs defined for each MICB card depends on the number of conferences and bridges specified on the card. A maximum of 10 conferences can be configured requiring 20 CDNs; two for each conference. One CDN is used by the conferees to call in and one CDN is for the conference chairperson.

Defining MICB ports as digital sets

Each MICB port represents an ACD agent with the digital set 2616. Table 8 shows how to use Multi-line Telephone Administration program LD 11 to configure these features.

Table 8
Configuring MICB ports as digital sets using LD 11

Prompt	Response	Description
REQ	NEW	Add a new data port
TYPE	2616	Digital telephone set M2616
TN	I s c u	Terminal number
CUST	0-99	Customer number
CLS	FLXA, VCE, WTA	ACD agent (FLXA can be used with X11 rel 22 and up for ports 16 through 31) Note
KEY	0 ACD <ACDDN> 0-99 <pos ID> (any DN)	ACD DN plus position ID
KEY	1 SCR <DN>	Line key
KEY	2 NRD	Not ready key
KEY	3 MSB	Make set busy key
Note: The administrator should consider chairperson dial-out restrictions through the MICB ports to prevent international dial-out.		

Note: Number of virtual ACD agents of the ACD queue is equal to the number of MICB ports. Example; if 12 ports are enabled, you must define 12 ACD agents. If the TN for the MICB is specified as 28 0 6, then TNs for the 12 agents are specified as 28 0 6 0 through 28 0 6 11.

Enabling the MICB card

To enable the MICB, load the Network and PE Diagnostic program LD 32 into the system memory using the system TTY to execute the **ENLC l s c** command, where **l** is the loop, **s** is the module or shelf, and **c** is the card to be enabled.

Configuring MICB using the MMI terminal

After the configuration of the MICB parameters, using the system TTY, you can proceed with the MICB administration by using the MICB MMI terminal. Before you can proceed with conference administration, you have to:

- 1 Configure the terminal.
- 2 Enter the keycode, if not already entered.
- 3 Login as an administrator.
- 4 Define a group of CDNs that will be used by the MICB (specify CDNs that already exist in Meridian 1).
- 5 Using the terminal, you can proceed with conference scheduling and MICB administration.

Note: The **MICB Administration** chapter describes the use of the terminal in configuring and administering of all MICB conference functions.

Configuring the MMI terminal for OA&M access

To access the administration and configuration menus you have to use a terminal. Specify the VT-100 type terminal interface characteristics to ensure compatibility with the MICB RS-232 interface.

Set the interface parameters as follows:

- Transmission speed; 9600 bps
- Data bits: 8
- Stop bit: 1
- Parity: No
- Flow control: none

Note: Do not use XON/XFF flow control.

MICB password security

To protect functional and software upgrades, the MICB provides **Protected Administration** menu accessible on the administration terminal. This menu allows you to edit passwords and perform functional and software upgrades.

For details of how to upgrade the MICB functions and software, go to the **MICB Administration** chapter of this document and access the **Protected Administration** menu.

Chairperson tasks

Each conference has a chairperson who is in charge of the conference events. If you dial in as a chairperson, you can perform several functions using your telephone set keys. To become a chairperson, you must be the first to dial the chairperson CDN. The chairperson CDN is defined in **Conference Reservation** in the **Conference Administration** menu using the MICB terminal.

Commands a chairperson can execute during a conference are listed in Table 9 below.

Note: When chairperson dials out to an other MICB conference, two ports are being used, the dial out port of this MICB and the dial in port of the other conference MICB. These two ports are not automatically disconnected, therefore the chairperson must disconnect the dial out port before leaving the conference.

Table 9 lists conference commands that are executed on the telephone set while the conference is in progress.

Table 9
Conference commands

Chairperson Command	Description
*0<DN>#	Dials out to a DN (called party directory number, which is not a conference participant)
*0#	Dials out to the assistant DN
*#	Redials last dialed DN
*1	Not used
*2	Returns to the conference with dialed party
*3	Returns to the conference without dialed party
*4	Locks the conference
*5	Unlocks the conference
*6	Counts conferees
*90	Drops all ports except the chairperson's port
*91	Drops the last dialed-out port
*92	Drops the last dialed-in port
*99	To stop or start the initial conference music by the chairperson. This is possible only when the chairperson is the first person joining the conference. First entry stops it, the second entry starts it.
Conferee command	Description
*	To stop or start the initial conference music by the first conferee that joins the conference.

MICB administration

Introduction

The MICB OA&M access is provided through the RS-232 port on an MICB card, which is connected directly to a VT-100 type terminal or to a PC running a terminal emulation program. You can also perform OA&M access over Ethernet. The following system and conference administration functions are accessible through the MICB administration terminal:

- Scheduling the MICB conferences and bridges
- Editing attributes of previously defined conferences and bridges and currently active conferences
- Configuring system parameters and global conference attributes
- Displaying conference status and log files contents
- Entering the keycode
- Displaying conference statistics
- Performing system maintenance
- Performing MICB functional and software upgrades

Before you can use the terminal, you must configure its interface parameters as described in the **Installation and configuration** chapter.

Logon screen

The logon screen appears when you press the Enter key after you connect a terminal to the MICB RS-232 port. This is the initial screen that displays the general status of the MICB card and conferences in progress. This includes:

- Start and duration of each scheduled conference

- Control DN's for the conference and the chairperson
- Number of ports occupied and, in parenthesis, the maximum number of ports reserved for that conference
- Status of each conference (**bridge** is permanent, **expanded** is using more ports than have been reserved, **active** is conference in progress, and **next** is conference scheduled to start shortly)
- Locked indicates if a conference is accessible or not accessible by a conferee that has not yet joined the conference
- Chairpersons names and name for each conference

Note: When you first install the MICB, the initial screen (Table 10) may display dummy conference scheduling left over from factory testing or lab testing. Make sure that you delete all dummy information displayed in the initial screen using the appropriate menus, such as Bridge Allocator, Conference Reservation, and Meeting Terminate menus in this chapter, before you start scheduling conferences.

Table 10
Initial screen showing the current MICB configuration status

Meridian Integrated Conference Bridge								
Card name: first_card						10005666		
Start	Duration	CDN	Ch- CDN	# Ports	Status	Locked	Chair- person	Title
00:00	forever	3080	3081	0(6)	bridge	yes	-	bridge 3080
09:15	2:45	3020	3021	7(5)	expand	no	Bob	Y Report
10:30	1:30	3010	3011	4(6)	active	yes	Barry	X Gate 2
11:10	2:00	3000	3001	0(3)	active	no	Dale	ZGate 3
13:15	2:00	3030	3031	0(8)	next	-	Jim	ZSales
Total ports in use: 11(20)					Last refreshed: April 15, 1997 11:30			
Login:								

User login

A user may login as an **operator** or as an **administrator**. The operator may access MICB conference functions and the administrator may access system administration functions. The operator deals with conference administration and maintenance. The administrator deals with system administration and maintenance as well as the conference administration and maintenance.

The default passwords are as follows:

- **oper** is the operator default password
- **admin** is the administrator default password

The default passwords may be changed by the administrator. If you cannot remember the password, you type **rst** and enter the MICB card ID. If an incorrect card ID is entered, an error message is displayed and the login prompt is presented again.

If the card ID is authenticated, both passwords are reset to their default values i.e. **oper** and **admin**. Example:

Login: **rst**

Enter card ID: < current card ID>

Passwords have been reset. Please login again.

Login: **admin**

The administrator can then assign new passwords by accessing the Protected Administration menu.

General administration procedures

General administration procedures are conventions or rules you have to adhere to when modifying default or existing parameters that define the MICB system and conference operation. These apply when using:

- General administration commands
- Object modify procedure
- Collection modify procedure
- Custom recording procedure

General administration commands

When you have to modify system administration parameters, you can use one or more of the following commands:

- **Modify** - Enter **M** to indicate that you wish to modify one or more parameters
- **Save** - Enter **S** to save modified parameters
- **Cancel** - Enter **C** to cancel the modification and allow the parameter to retain its previous value

After the session is completed, the screen displays again the **Modify, Save, or Cancel** command line for additional modification of parameters, if required.

To navigate from menus to other menus or to display help, use the following terminal keys:

- ***** - Returns you to the previous menu
- **/** - Returns you to the top menu level
- **?** - help; that assists you with commands in the current menu

Object modify procedure

To modify a value or attribute of an object, the program responds with a sequence of prompts, one prompt for each attribute of the object. The prompt specifies the name and the current value of the attribute as follows:

attribute_a (current_value_a): **new_value_a**

attribute_b (current_value_b): .

For each prompt user may respond in three ways:

- **<cr>** - accepts the current value by pressing the Enter key
- **value** - changes the attribute by entering a new value
- **.** - terminates the session by entering “.” (dot)

In some cases the system may display the current value and a list of available values to select. Example:

```
attribute_c (current_c, (1-aaaa, 2-bbbb, 3-cccc)): 2  
(where the value of attribute_c has been changed to bbbb)
```

After the session is completed the new set of values is displayed and you are prompted to **Modify, Save, or Cancel** the modification.

Collection modify procedure

This procedure modifies, deletes, or adds an entry to a collection of items of the same type, such as for example, a list of DNs.

You can move through the list of items by entering **<cr>** to skip the item, enter a **command** to modify the item, or enter **.** (dot) to exit the list. The **command** can be:

- **m** - to modify the item in the list using object modify procedure
- **d** - to delete a selected item in the list
- **i** - to insert a list of items above the currently selected item
- **a** - to append a list of items below the currently selected item

For insert and append commands, you are prompted to add a new item. This sequence is terminated by entering the **.** (dot). When the command(s) are executed, the program gives you the option to **Modify, Save, or Cancel** the changes. Only when you enter **Save** will the new changes be accepted.

When the end of the list is reached, the new list is displayed or printed and you are prompted again to **Modify** or **Exit** the list.

Brand line greeting

Brand line greeting file is automatically named **BRANDLIN.WAV** when created over the telephone set. You have to record a brand line greeting in each language separately for the A-law and the μ -law.

Brand line greeting is used during the conference to provide customized greeting in one of the five available languages that specifically identifies the conference or the company holding the conference.

Customer greeting files provides:

- customer recording of a brand line greeting in a specific language
- the user can select one of the three greeting options:
 - brand line greeting
 - no custom greeting
 - custom conference greeting

Use the message recording over the telephone set method to record brand line message, such as, for example, "Welcome to Nortel conference bridge". The brand line message is identified as BRANDLIN.WAV file to distinguish it from other recorded files. For telephone set message recording, refer to "Brand line Audio Recorder" on page 75.

A conference or a bridge has two attributes:

- language - to select one of the five languages for the brand line recording
- custom greeting - **custom greeting (brand line, (1-no, 2- meeting))**:

User can then select one of the three options:

- <cr> - default option, which is the brand line greeting file BRANDLIN.WAV (if the brand line message is not recorded a message will be displayed)
- no custom greeting - this uses the WELCOME.WAV file "Welcome to the meeting").
- custom meeting greeting

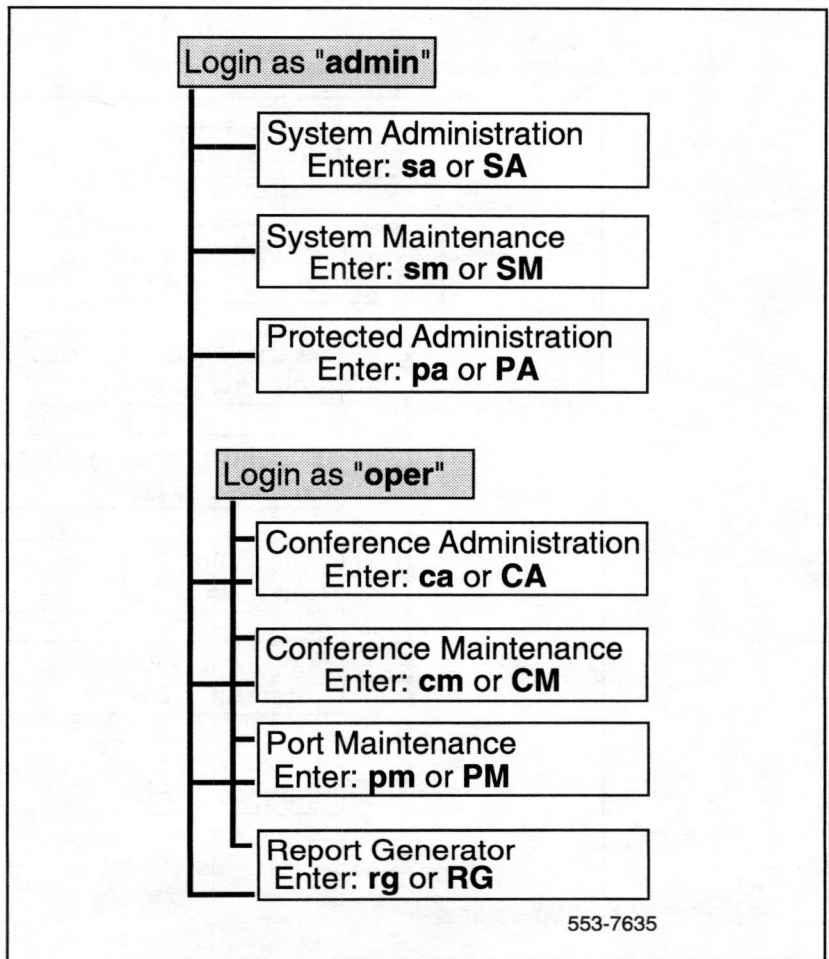
Accessing the Main Menu

The MICB Main Menu consists of administration and configuration menus, where the administrator can access both the system administration and configuration menus and the operator can access only the conference configuration menus.

To access the Main Menu you must have a terminal connected to the MICB RS-232 port with properly configured interface parameters. You should also login by entering the appropriate password.

Figure 9 shows the Main Menu and its menus that can be accessed by the administrator by typing the default password **admin** and those that can be accessed by the operator by typing the default password **oper**. The administrator may change the passwords as required by security. The administrator can access all menus, however, the operator can access only the conference related menus as shown in the figure.

Figure 9
Main Menu

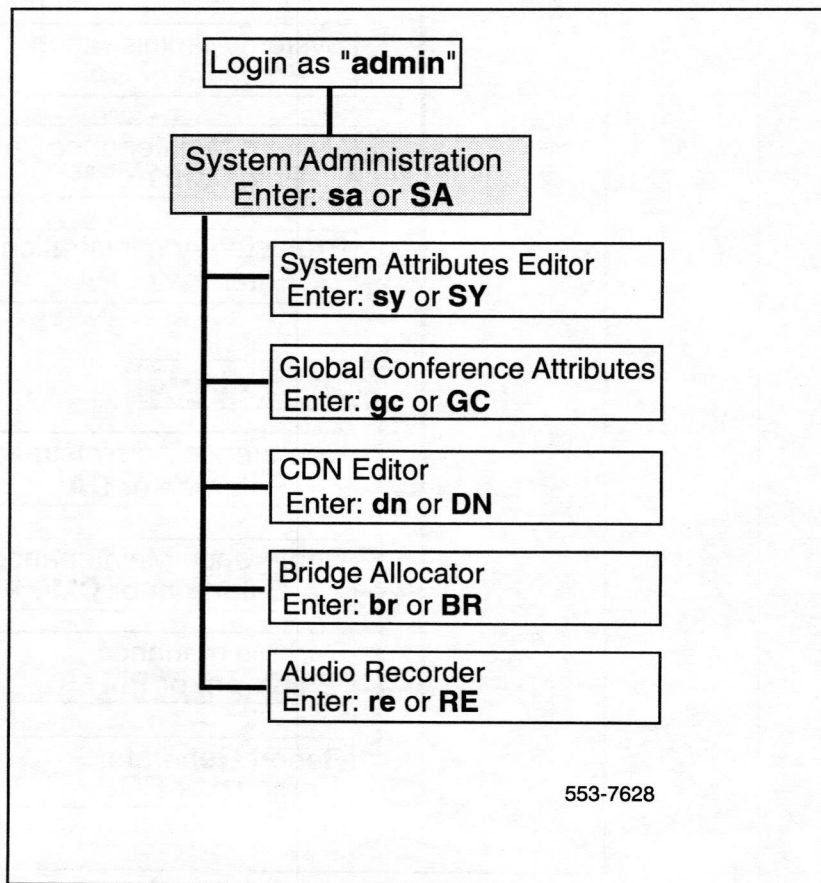


After you are logged in as an administrator or an operator you can access various menus, however, you have to follow general administration procedures.

System Administration menus

The System Administration menus are accessed from the Main Menu after you logged in as an administrator (**admin**) and by entering the **sa** or **SA** or the full command (**SAdmin**). Figure 10 shows the System Administration screen and all the menus accessible from this screen.

Figure 10
System Administration menu



System Attribute Editor

Use this menu to modify system attributes. These are:

- **card name** - a character string with maximum length of 10 characters. The name appears at the top of the Initial Screen, if specified.
- **idle time-out** - the time the terminal is left idle before it automatically logs out and displays the Initial Screen with general system status. The default time-out is 20 minutes and the range is from 20 to 60 minutes.
- **refresh period** - the Initial Screen refresh (update) time when the terminal is not being used. The default is 5 minutes and the range is from 0 to 60 minutes. Enter 0 if you wish to disable system status display.
- **report aging** - the number of days the system will maintain old reservation records. The default is 60 days and the range is from 0 to 120 days. If you select 0, the records are deleted at the end of the day the conference was conducted.
- **short occupancy** - a threshold used to detect very short connection time of an MICB port assigned to a conference. If the connection is less than the threshold it may indicate bad connection or an incorrect CDN dialed. When this condition is detected, the system increments a counter and when counters are checked, those with peg-counts are displayed as potential problems.
- **default language** - a language selected by the administrator to be the default language. This is the first language in the list of defined languages. Languages defined in the system are stored on the PCMCIA in ASCII format.
- **agent ID** - ACD agent ID is a number of up to 4-digits long. The agent ID length is the basis for generating other agent ID numbers. If the agent ID option is not defined in the system, 0 must be entered. Note that the agents IDs must be consecutive numbers within the lower and upper limit of the available numbers, starting with the number assigned to the first agent ID. To find the available block of consecutive numbers, use LD 23 prompts SCB or ADS to print the current status of the assigned numbers.
- **application traffic report** - default is 0 to disable the report, range 1-24 allows you to select the number of reports that will be issued every hour-on-the-hour.

Ethernet defining attributes:

- **subnet mask** - has XXX.XXX.XXX.XXX format, where every XXX is in the range 0-255. Subnet mask in binary presentation of 32 bits has at least the first 8 digits "1" and the last digit is "0".
- **gateway address** - has XXX.XXX.XXX.XXX format, where every token is in the range 0-255.
- **IP address** - is Ethernet protocol address and it has the same format at the gateway address.

Example:

login: **admin**

Previous admin login: Feb 11, 1997 10:00

SAdmin, SMint, PAdmin, CAdmin, PMaint, CMaint, RGen, Logout: **sa**

SYSstem, GConf, DN, BRidge, EScript, REcorder: **sy**

System Attributes:

card name:

idle time-out minutes: 20

refresh period minutes: 1

report aging days: 60

short occupancy seconds: 10

default language: americam_english

agent id: not defined

application traffic report hours: 0

subnet mask: 255.255.248.0

gateway address: 141.226.199.254

IP address: 141.226.199.50

Modify, Save, Cancel: m

card name (): **first_card**

idle timeout minutes (20): **25**

refresh period minutes (1):

report aging days (60):

short occupancy seconds (10):

default language (americam_english, (1-french, 2-brasilian_portuguese, 3-LA_spanish, 4- UK_english)):

agent id (not defined):

application traffic report hours (0): 1

subnet mask (255.255.248.0):

gateway address (141.226.199.254):

IP address (141.226.199.50):

New System Attributes:

card name (): first_card
idle timeout minutes: 25
refresh period minutes: 1
report aging days: 60
short occupancy seconds: 10
default language: american_english
agent id: not defined
application traffic report hours: 1
subnet mask: 255.255.248.0
gateway address: 141.226.199.254
IP address: 141.226.199.50
Modify, Save, Cancel: **Save**

System Attributes have been updated.

SYstem, GConf, DN, BRidge, EScrip, REcorder: /

SAdmin, SMint, PAdmin, CAdmin, PMaint, CMaint, RGen, LOgout: lo

This concludes the System Attributes Editor session, returns you to the Main Menu, and logs you out.

Global Conference Attribute Editor

Use this menu to modify global conference attributes. When you login as the administrator, you are prompted to modify the following attributes applicable to all conferences:

- **record limit** - a maximum number of seconds allowed to record the conferee name. The default is 2 seconds and the range is from 1 to 10 seconds.
- **assistance DN** - a number the chairperson can dial for assistance. The chairperson must first dial *0#, where the implied assistance DN, which can be up to 8 digits long, must have been previously defined.

Example:

SYstem, GConf, DN, BRidge, EScripT, REcorder: **gc**
Global Conference Attributes:
record limit seconds: 2
assistance DN: 2020
Modify, Save, Cancel: m
record limit seconds (2): **7**
assistance DN (2020): **<cr>**
New Global Conference Attributes:
record limit seconds: 7
assistance DN: 2020
Modify, Save, Cancel: Save
Global Conference Attributes have been updated.
SYstem, GConf, DN, BRidge, EScripT, REcorder: **/**
SAdmin, SMint, PAdmin, CAdmin, PMaint, CMaint, RGen, LLogout: **lo**

This concludes the Global Conference Attributes Editor session, returns you to the Main Menu, and logs you out.

CDN Editor

Use this menu to add or modify Control Directory Numbers. One CDN is used by conferees to dial-in and join the conference and the other CDN to call the chairperson of that conference.

Before you start editing CDNs, make sure you adhere to the following rules:

- Maximum length of a CDN is 8 digits.
- Each CDN may appear only once on the list (all CDNs must be unique).
- A CDN may not be deleted if it is assigned to a conference or bridge.
- When a CDN is modified, future conferences that would have used the old CDN will now use the new CDN. Active conferences and bridges are not affected by this change.
- The list of dial-in CDNs must be coordinated with the numbering plan in Meridian 1.
- The maximum number of CDNs defined for an MICB card is 20 (10 conferences each with two CDNs for dial-in and chairperson).
- To delete a conference item use the **d** command the same way you use the **i** (insert) or **m** (modify) commands in the next example.

In the following example, you have to add 2 new CDNs (#2000 and #2002) and change CDN #2002 and #2008.

Example:

```

SYstem, GConf, DN, BRidge, EScript, REcorder: dn
Current CDNs: 2001, 2002, 2003, 2004, 2005, 2006, 2007
Modify, Save, Cancel: m
CDN (2001): i
insert: 2000
insert: .
CDN (2001): <cr>
CDN (2002): m
modify: 2008
CDN (2008): .
New CDNs: 2000, 2001, 2003, 2004, 2005, 2006, 2007, 2008
Modify, Save, Cancel: Save
List of CDNs has been updated.
SYstem, GConf, DN, BRidge, EScript, REcorder:

```

Bridge Allocator

Use this menu if you wish to reserve MICB ports for a permanent conference bridge. The MICB ports permanently tied up by this bridge are not available for on demand conference use. If by mistake a port assigned to the bridge is used for a conference, and error message will be issued and the assignment will be prevented. The same applies if a double assignment is attempted between two bridges.

The Bridge Allocator allows you to modify a bridge in a list of bridges. You can add new entries to the bridge and change existing entries.

The configurable attributes of the bridge are:

- **number of ports** - a number of MICB ports allocated for a bridge. The prompt shows the current number and the maximum ports available for permanent bridges. The specified number of ports must be greater than 0.
- **language** - defines the selected language for prompts and announcements. The list shows all the available languages. Select a new one by entering its number or press <cr> to use the default.
- **title of conference** - name assigned to the conference bridge. Maximum name length is 20 characters.

- **main CDN** - the directory number to dial in to the bridge to join the conference. The prompt shows the current number and a list of available DNs. You can select any of these DNs by entering it on the list.
- **conferee password** - a password code up to 8 digits long is entered to access the bridge. If 0 is specified, the password is not defined. If user enters a number 4-8 digits long, a password is automatically defined, which is used to access the bridge.
- **chairperson CDN** - directory number to access the conference bridge as a chairperson.
- **chairperson password** - password code up to 8 digits long is entered to access the bridge as a chairperson. If 0 is specified, the password is not defined. If user enters a number 4-8 digits long, a password is automatically defined, which is used to access the bridge as a chairperson.
- **name entry** - option to allow the entry of the conferee's. Default is Yes. If Yes, the conferee is prompted to record their name. The allowed recording time is restricted by Global Conference Attribute Editor from 1 to 10 seconds.
- **custom greeting** - option to allow greeting of a conferee. The default is **brandline**. The other options are **no**, and **meeting**. The custom greeting is invoked during conference reservation and during permanent conference bridge allocation.

Example:

Delete bridge no. 3 and modify chairperson_CDN and other attributes of bridge no. 2.

System, GConf, DN, BRidge, EScrip, REcorder: **br**
Current bridges:

	CDN	Chair- CDN	#Ports	Name _Entry	Gree- ting	Title
1	2000	2001	3	yes	brandline	Bridge2000
2	2020	2021	4	no	no	Bridge2020
3	2030	2031	3	yes	meeting	Bridge2030

Modify, Insert, Delete, Exit: m 2

main CDN (2020 (1-2096, 2-2098)): <cr>

conferee password length (0):

chairperson CDN (2021, (1-2096, 2-2098)): 1

chairperson password length (0):

number of ports (4(8)): 6

language (americam_english, (1-french, 2-brasilian_portuguese, 3-LA_spanish, 4- UK_english))::

name entry (no): **Yes**

custom greeting (no): **Yes**

name of conference (Bridge2020): <cr>

New Configurable Attributes of Bridge 2:

main CDN : 2020

conferee password: not defined

chairperson CDN: 2096

chairperson password: not defined

number of ports: 6

language: american_english

name entry: Yes

custom greeting (brandline (1-no, 2-meeting)) : brandline

name of conference: Bridge2020

Modify, Save, Cancel: Save

configurable attributes of bridge 2 have been updated.

Current bridges:

	CDN	Chair- CDN	#Ports	Name _Entry	Gree- ting	Title
1	2000	2001	3	yes	brandline	Bridge2000
2	2020	2096	6	yes	no	Bridge2020
3	2030	2031	3	yes	meeting	Bridge2030

Modify, Insert, Delete, Exit: d 3

Delete bridge 3 ? (Yes, (No)): **Yes**

Bridge 3 is being closed.

Closing may take up to one minute. Please wait.

Current bridges:

	CDN	Chair- CDN	#Ports	Name _Entry	Gree- ting	Title
1	2000	2001	3	yes	brandline	Bridge2000
2	2020	2096	6	yes	no	Bridge2020

Modify, Insert, Delete, Exit: e

SYstem, GConF, DN, BRidge, EScripT, REcorder:

Note: When a parameter such as CDN is changed for an existing bridge, at the time of Save, the bridge will be closed and reopened. Participants on the bridge will be disconnected.

If you try to reduce the number of ports while they are active, an error will be displayed and the system will prompt you to reenter the original number of ports.

Closing a bridge may take up to one minute.

Event Script files

The Audio Script files are associated with conference events. An Audio Script may contain a single file or a set of files that are activated in a specific sequence. These files cannot be changed.

Table 11 shows a list of events that occur during a conference. For each event the system plays one or more audio files to instruct the conferees and the chairperson. These audio files are listed in Table 12 and are numbered in the File column of this table.

Table 11
Voice script files

No.	Situation	Files
With name entry option:		
1.	Greeting to dial-in conferee with name entry	1, 2, 13
2.	Entry of conferee to meeting with prompt name	14, 3
3.	Exit of conferee from meeting with prompt name	15, 4
Without name entry option:		
4.	Greeting to dial-in conferee	1
5.	Entry of conferee to meeting	14
6.	Exit of conferee from meeting	15
General Prompts:		
7.	Announcement to single conferee	5, 6
8.	Chairperson command acknowledge	16
9.	Chairperson command negative acknowledge (lack of resources)	17
10.	Chairperson command error acknowledge (illegal command)	17
11.	Dial-in to non-existent meeting	18
12.	Dial-in to locked meeting	18
13.	Dial-in to fully attended meeting	19
14.	2nd chairperson dial-in attempt	19
15.	Count conferees	27

Table 11
Voice script files

No.	Situation	Files
16.	Meeting termination early warning-10 min till end	15, 7
17.	Meeting termination announcement	15, 8
18.	Record main menu	9
19.	Record invitation	13
20.	Record stopped	16
21.	Record error operation	11,9
22.	Record error operation for new file	11,10
23.	Record main menu for new file	10
24.	Noting to play for new file	12
25.	Password request	21
26.	Repeated password request	22
27.	Incorrect password	23, 22
28.	Exit from the system	24,25,26

Table 12 represents the system script files that can be played for a specific event as shown in Table 11 where, for example event 1 invokes files 1, 2, and 13.

Table 12
Event script files (Part 1 of 5)

No.	Contents
1	<i>Welcome to the meeting.</i>
2	<i>Please enter your name.</i>
3	<i>Announcing the arrival of</i>
4	<i>Announcing the departure of</i>

Table 12
Event script files (Part 2 of 5)

No.	Contents
5	<i>You are the only one in the meeting now.</i>
6	Music
7	<i>Meeting terminates in a few minutes</i>
8	<i>Meeting terminates now</i>
9	<i>Press 2 to play, 5 to record, # to exit</i>
10	<i>Press 5 to record, # to exit</i>
11	<i>Illegal command</i>
12	<i>Nothing to play</i>
13	tone 6 for 500 ms
14	tones: 3,4,5,6 for: 100ms, 100ms, 100ms, 300ms respectively
15	tones: 6,5,4,3 for: 100ms, 100ms, 100ms, 300ms respectively
16	tone 2 for: 200ms on, 50ms off, 200ms on, off.
17	tone 1: 5 bursts of 80ms on/ 80ms off
18	tone 1: 250ms on/250ms off (Overflow tone) for 10 seconds
19	tone 1: 500ms on/500ms off (busy tone) for 10 seconds
20	tone 3: 200ms off/300ms on
21	<i>Password</i>
22	<i>Please enter your password followed by number sign</i>
23	<i>Password incorrect</i>
24	<i>You have failed to enter your password</i>

Table 12
Event script files (Part 3 of 5)

No.	Contents
25	<i>Please hang-up and call your Meridian Integrated Conference Bridge administrator</i>
26	<i>Good-by</i>
27	<i>The number of conferees is</i>
28	<i>One</i>
29	<i>One (for a suffix e.g. twenty one)</i>
30	<i>Two</i>
31	<i>Two (for a suffix e.g. twenty two)</i>
32	<i>Three</i>
33	<i>Three (for a suffix e.g. twenty three)</i>
34	<i>Four</i>
35	<i>Four (for a suffix e.g. twenty four)</i>
36	<i>Five</i>
37	<i>Five (for a suffix e.g. twenty five)</i>
38	<i>Six</i>
39	<i>Six (for a suffix e.g. twenty six)</i>
40	<i>Seven</i>
41	<i>Seven (for a suffix e.g. twenty seven)</i>
42	<i>Eight</i>

Table 12
Event script files (Part 4 of 5)

No.	Contents
43	<i>Eight (for a suffix e.g. twenty eight)</i>
44	<i>Nine</i>
45	<i>Nine (for a suffix e.g. twenty nine)</i>
46	<i>Ten</i>
47	<i>Eleven</i>
48	<i>Twelve</i>
49	<i>Thirteen</i>
50	<i>Fourteen</i>
51	<i>Fifteen</i>
52	<i>Sixteen</i>
53	<i>Seventeen</i>
54	<i>Eighteen</i>
55	<i>Nineteen</i>
56	<i>Twenty</i>
57	<i>Twenty (for a suffix e.g. twenty one)</i>
58	<i>Twenty one</i>
59	<i>Twenty two</i>
60	<i>Twenty three</i>

Table 12
Event script files (Part 5 of 5)

No.	Contents
61	<i>Twenty four</i>
62	<i>Twenty five</i>
63	<i>Twenty six</i>
64	<i>Twenty seven</i>
65	<i>Twenty eight</i>
66	<i>Twenty nine</i>
67	<i>Thirty</i>
68	<i>Thirty (for a suffix e.g. thirty two)</i>
69	<i>Thirty one</i>
70	<i>Thirty two</i>

Table 13 lists the beep frequencies and their level

Table 13
Tone specification

Index	Frequency (Hz)	Level (dBm/freq)
1	480+620	-24
2	440+660	-17
3	440	-14
4	560	-17
5	660	-17
6	880	-17
Maximum single frequency deviation is +/- 2% Maximum level deviation is +/- 5 dB		

Brand line Audio Recorder

Audio Recorder allows you to create new brand line custom greetings for each individual conference. The brand line custom audio files are used for customized greeting during conference. A user may define up to 5 brand line audio files.

When you select Recorder option, you are presented with a list of brand line custom audio files, which can be modified (by entering **m**) or deleted (by entering **d**). You can also inset new brand line files (by entering **i**). The default audio files supplied by the factory may not be modified.

Example:

This is an example of a recording session:

SYstem, GConf, DN, BRidge, EScripT, REcorder, ?: **re**
language (americam_english, (1-french, 2-brasilian_portuguese,
3-LA_spanish, 4- UK_english)): <cr>

File Name

1 a:mlaw\user\english\BRANDLIN.WAV: **m**

Dial 2099 to begin recording session.

Follow voice instructions.

Typing "exit" will end the recording session.

After the recording is completed and the phone is off-hook

Upon completion of recording, select one of the following:

Save, Modify, Cancel: s

SYstem, GConf, DN, BRidge, EScripT, REcorder, ?:

The newly recorded message will be played only after it is saved. It will be played when a conferee dials the conference or the chairperson CDN.

Help display

When you choose the help command "?", the system displays commands related to the string of commands in the menu, as follows:

SYstem, GConf, DN, BRidge, EScripT, REcorder, ?: ?

Short command	Full command	Explanation
sy	system	System Attribute Editor
gc	gconf	Global Conference Attribute Editor
dn	dn	CDN Editor
br	bridge	Bridge Allocator
re	recorder	Audio Recorder

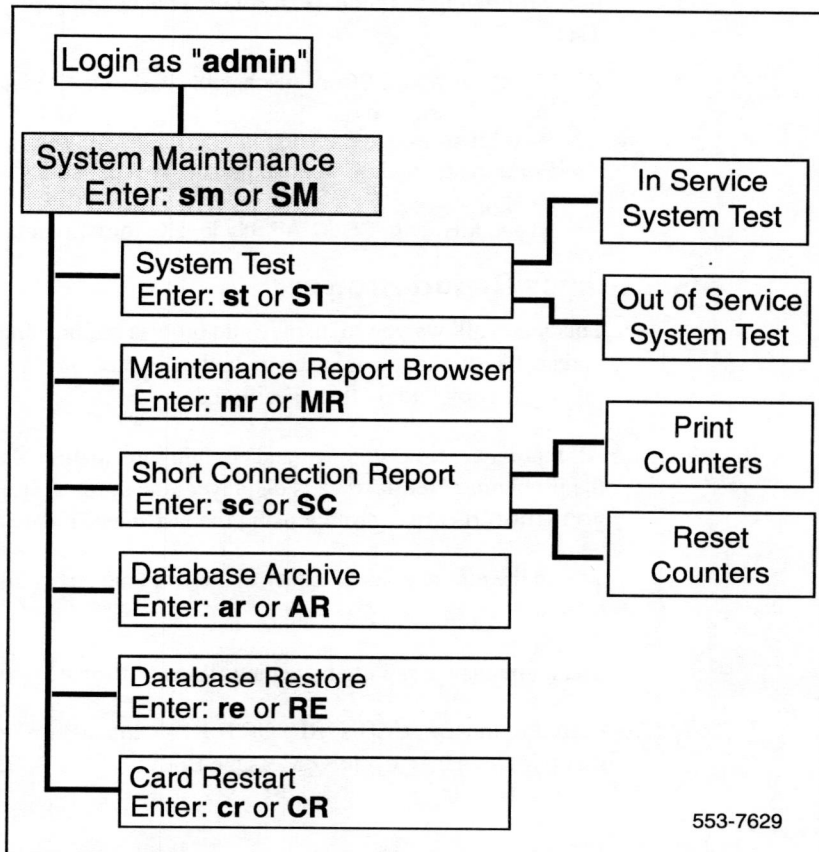
System, GConf, DN, BRidge, EScripT, REcorder,?:

System Maintenance menus

The System Maintenance menus are accessed from the Main Menu after you logged in as an administrator (**admin**) and by entering the **sm** or **SM** or the full command (**SMaint**).

Figure 11 shows the System Maintenance menu structure. The System Test and Short Connection Report menus have two sub-menus.

Figure 11
System Maintenance menu



System Tests

Use this menu to perform system component tests. You can perform in-service tests that do not disrupt service and out-of-service tests that disrupt service for the duration of the test. If you select:

- **i** - you will perform in-service tests.
- **o** - you will perform out-of-service tests.

Example

In the following example, perform the service impacting (out-of-service) tests.

```
STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?: st
Inserv, Outserv: o
Perform service impacting test ? (Yes, (No)): Yes
Performing service impacting test ...Test passed.
Inserv, Outserv: *
STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?:
```

Maintenance Report Browser

This menu allows you to display and browse maintenance reports according to date. These reports are used to analyze system problems based on error messages compiled on that specified date.

All reports are time stamped and contain information regarding the cause of the problem. After the data is displayed, the system returns to the **year-month-day** prompt using the last selected date as default.

To exit the report, enter “.” (dot), to interrupt the report display, enter “*<cr>” (star and return).

The maintenance reports have the following format:

```
<serial number>: <MON_REPORT_ID> <channel #> <time>
<Applic_Manager_cycle> <Message Body>
```

Example:

Display the maintenance report for March 15, 1996.

```
STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?: mr
year(1996): 1996
month (11): 03
day (22): 15
1234:timer101 ch01 16:16:18:111 9000 "Num: 100 Timing Stop. 00."
1235: sig100 ch00 16:17:05:234 9900 "SIG: Q_APP in msg:0000005A"
0001:HW PCMCIA001 ln0077 ch01 16:25:29:836 PCMCIA card
inserted in socket 1
year (1996): .
STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?:
```

The selected date must be in the past not future. The old files that exceed the report aging number of days are discarded. If date entered is too old, an error message is displayed. If the date is within the correct date range, but there are no report entries for that day, a message indicating no messages is displayed.

Short Connection Report

The Short Connection Report menu allows you to present or reset the short connection peg-count.

Short port occupancy may indicate fault condition on the particular port or dialing of an incorrect CDN. The short occupancy range is set in the System Administration menu from 1 to 30 seconds (default is 10 seconds). If 0 is selected, the short occupancy count is disabled.

You have an option to print (**p**) or to reset (**r**) the counter. When printing the counters peg-count, all ports with a count are presented in the following format:

```
port #   today's_count   total_count
```

today's count - count of short connections that occur today

total count - cumulative count of all short connections since the MICB was last reset or the short connection counters were reset.

If all counters are zero, the header is printed followed by the message:
all counters are zero

When you execute the reset, all counters are set to zero.

Example:

STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?: **sc**
 Print, Reset: **p**

Port #	today's_count	total_count
10	2	4
18	1	10
31	5	34

Print, Reset: **r**
 Reset all short connection counters? (Yes, (No)) **Yes**
 Counters reset.
 Print, Reset: *****
 STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?:

When help is displayed, you get the following: ?

Short command	Full command	Explanation
p	print	Present peg-count of short port occupancy.
r	reset	Reset peg-count of short port occupancy.

Database Archive

Database Archive allows you to backup customer database. The system copies a set of database files from the active PCMCIA card in lower slot (drive A): to the backup PCMCIA card in the upper PCMCIA socket (drive B:). Names of files to be backed up are specified in the DB Description file. These files include configuration and reservation databases, as well as user made voice files.

For backup, you can use PCMCIA ATA Flash card and Type II and Type III cards. If the PCMCIA Flash card memory is too small to accept all the archived database information, an error will be displayed indicating that there is not enough memory.

Example:

STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?: **ar**
 Backup Database ? (Yes, (No)) **y**
 Please wait, performing backup... completed.
 STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?:

Database Restore

Database Restore allows you to restore customer database to the system PCMCIA card installed in the lower slot (drive A:). The system copies a set of files from the backup PCMCIA card installed in the upper slot (drive B:) to the active PCMCIA card in the lower slot (drive A:). Names of files to be restored are specified in the DB Description file.

Example:

STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?: **re**
 Restore Database ? (Yes, (No)) **y**
 Please wait, performing restore... completed.
 STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?:

Card Restart

Restarts the MICB card. This initiates the software reload.

STest, MReport, SCon, ARchivdb, REstordb, CRestart, ?: **cr**
 Restart MICB card ? (Yes, (No)) **yes**

This action returns the MICB card to the initial screen and you must login again.

Help display

Displays the commands and their explanation at the System Maintenance level.

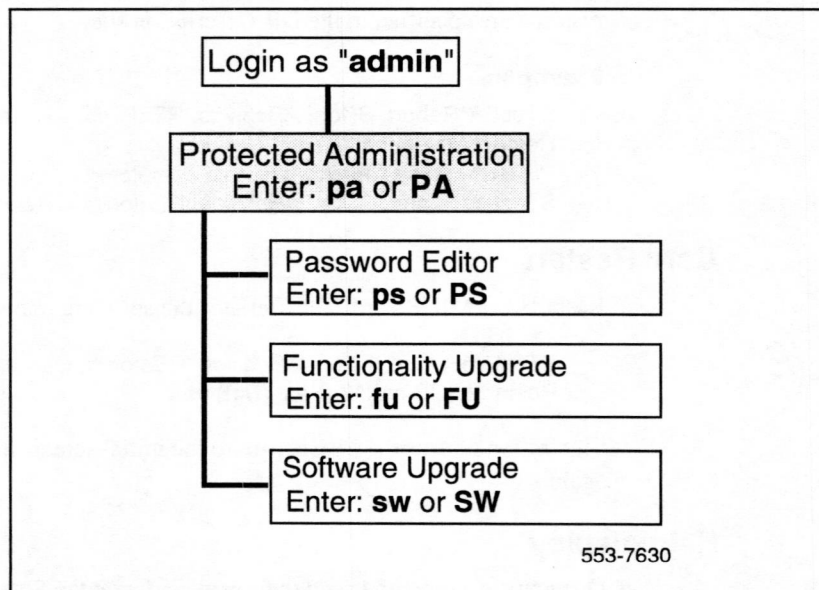
Short command	Full command	Explanation
st	stest	System Test directory
mr	mreport	Browse Maintenance Reports
sc	scon	Short Connection Report directory
ar	archivdb	Back-up customer database
re	restordb	Restore customer database
cr	crestart	Reset MICB card

Protected Administration

The Protected Administration menus are accessed from the Main Menu after you logged in as an administrator (**admin**) and by entering the **pa** or **PA** or the full command (**PAdmin**).

Figure 12 shows Protected Administration menus used for password administration, and port and software upgrade keycode administration.

Figure 12
Protected Administration menu



Password Editor

To change passwords log in as an administrator using the default password **admin** and access the Password Editor menu from the Protected Administration menu.

You can change the default or any other password to a new password. The maximum password length is 10 characters. The operator and the administrator passwords must not be the same.

If you do not remember the password, you can enter the **rst** command and then, you will be prompted to enter the card ID. After the card ID is authenticated, the system resets the passwords to their default (admin, oper) and then you can modify the passwords.

Example:

This example shows how to modify the operator and the administrator passwords:

```
PSweditor, FUpgrade, SWUpgrade, ?: ps
Current Passwords:
oper: oper
admin: admin
Modify, Save, Cancel: m
oper (oper): operator
admin: hokeypokey
New passwords:
oper: operator
admin: hokeypokey
Modify, Save, Cancel: Save
Passwords have been updated.
PSweditor, FUpgrade, SWUpgrade, ?:
```

Functionality Upgrade

Functionality Upgrade allows you to change the number of available MICB ports/channels. To be able to change the number of ports/channels, you must enter the keycode, which is compared with the one stored in the MICB memory. Following the keycode authentication the currently enabled MICB ports/channels are displayed.

You are allowed three attempts to enter the correct keycode. If you fail to enter the correct keycode, the changes you made will not take effect. If the keycode has been authenticated, the changes you made are stored in the memory and will take effect allowing to use specified number of MICB ports.

The keycode is entered using three prompts key-code1, key-code2 and key-code3, each requires entry of 8 digits.

Example:

This example will expand the number of available MICB ports from 8 to 16:

```
PSweditor, FUpgrade, SWUpgrade, ?: fu
max conf_ports: 8
Modify, Save, Cancel: m
max conf_ports (8): 16
Modify, Save, Cancel: Save
Enter key-code1: 12121234
Enter key-code2: 23232345
Enter key-code3: 32222385
Failure on accepting key-code!
Modify, Save, Cancel: Save
Enter key-code1: 121ad234
Enter key-code2: 12128934
Enter key-code3: 32222385
PSweditor, FUpgrade, SWUpgrade, ?:
```

Software Upgrade

Software Upgrade menu allows you to upgrade the MPU and the DSP software on an active MICB card. The new software is stored on a PCMCIA card, which should be installed in slot A: on the MICB card before executing the software upgrade command. If the PCMCIA card is not installed, when you try to save the upgrade, the system issues an error message as follows:

```
There is no PCMCIA in socket 1
MPU upgrade failed.
There is no PCMCIA in socket 1
DSP upgrade failed.
```

To upgrade the software:

- 1 Plug the PCMCIA Flash card into the top PCMCIA slot on the MICB. Make sure that the PCMCIA hard drive card is still installed in the lower PCMCIA slot.
- 2 Login as the administrator "admin" and proceed as shown in the example below.

Example:

Upgrade the software:

PSweditor, FUpgrade, SWUpgrade, ?: **sw**

software release: 03, issue: 07

Modify, Save, Cancel: **m**

Modify software ? (Yes, (No)) **yes**

Modify, Save, Cancel: **Save**

Installation of software in progress...

New s/w will be used following MICB restart.

Restart MICB ? (Yes, (No)) **No**

PSweditor, FUpgrade, SWUpgrade, ?:

- 3 After the upgrade is completed, you may remove the PCMCIA Flash card from the upper PCMCIA slot.

Help display

The following help information is displayed when help (?) command is chosen at the Protected Administration level.

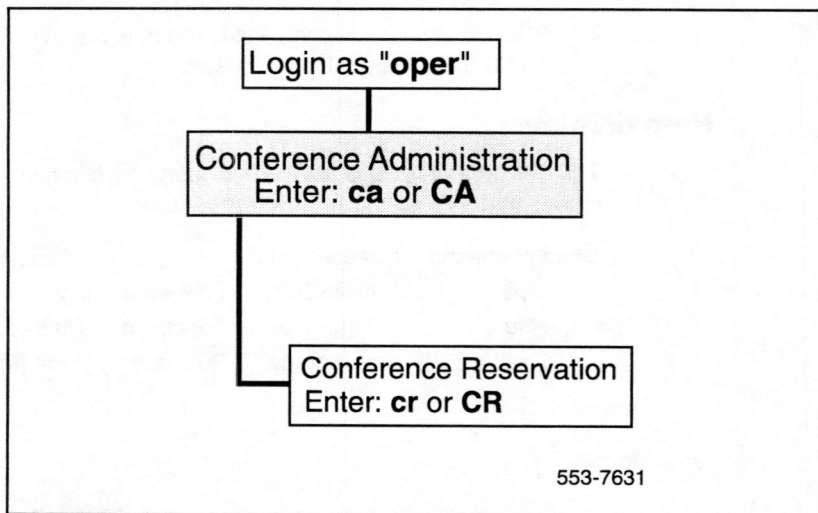
Short command	Full command	Explanation
ps	psweditor	Password Editor
fu	fupgrade	Functionality Upgrade (MICB ports)
sw	swupgrade	Software Upgrade (MPU/DSP s/w)

Conference Administration

The Conference Administration menu is accessed from the Main Menu after you logged in as an administrator (**admin**) or an operator (**oper**) and by entering the **ca** or **CA** or the full command (**CAdmin**).

Figure 13 shows the Conference Administration menu used for conference reservation. You can login as an administrator or an operator.

Figure 13
Conference Administration menu



Conference Reservation

This menu allows you to schedule a conference, delete, or modify an already scheduled conference.

Note: This menu is effective only for new and already scheduled conferences that are not active, but will be active in the future in the time span from a minimum of 10 minutes to a maximum of 6 months from now. For a conference that is already active or will start in 3 minutes or less, you have to use the Conference Maintenance menu to make any changes. The maximum length of a conference is 12 hours.

It is advisable to include into the greeting the request that conferees enter their names.

Upon selecting the Conference Reservation menu, you are prompted to enter a date you wish to add, delete, or modify a conference. The system displays all scheduled conferences for that date.

A conference can be modified by selecting its number in the displayed list and enter the modify command (**m**), or a new conference can be added to the list by entering the insert command (**i**). You can also delete a conference by selecting the number of the conference in the list of conferences and entering the delete command (**d**).

During conference modification, the system presents the number of ports currently available for the specified time slot and the available CDNs. If either ports or CDNs are not available, an error message is displayed, the modification is aborted, and the scheduling menu is displayed again. A maximum of 256 conferences can be scheduled for one day.

When you are modifying a conference, if you change start time and duration, the CDNs and number of ports are cleared to avoid conflict with already scheduled conferences.

The following are configurable attributes of each conference:

- **start** - the specified conference starting time (HH:MM), rounded to the nearest 5 minutes. A conference may start and end 2 minutes before the requested time. If start time and/or duration are modified, CDNs and number of ports are cleared to avoid conflict with other scheduled conferences. A message indicates that.
- **duration** - the duration of a conference in (HH:MM) rounded to the nearest 5 minutes. Minimum duration is 15 minutes and maximum is 12 hours. A conference may cross a single day boundary by bridging the 12:00 pm (midnight). The second day entry has a star (*) appended.
- **main CDN** - the directory number dialed by a conferee to access a specific conference. This prompt displays the current CDN (if any) and a list of available CDNs. You can select a CDN by entering its serial number.

- **conferee password** - a password code up to 8 digits long is entered to access the bridge. If 0 is specified, the password is not defined. If user enters a number 4-8 digits long, a password is automatically defined, which is used to access the bridge.
- **chairperson CDN** - the CDN that the chairperson dials to access the conference
- **chairperson password** - password code up to 8 digits long is entered to access the bridge as a chairperson. If 0 is specified, the password is not defined. If user enters a number 4-8 digits long, a password is automatically defined, which is used to access the bridge as a chairperson.
- **number of ports** - the number of ports reserved for this conference. The prompt displays the current number of ports and the maximum number of ports available in the requested time range. The number must be greater than 0.
- **language** - defines the selected language for prompts and announcements. The list shows all the available languages. Select a new one by entering its number or press <cr> to use the default.
- **name entry** - (Yes) or No. The default is Yes. If Yes, the conferee is required to state their name when joining the conference. The length of recording is set between 1 and 10 seconds using System Attributes Editor.
- **expansion** - Yes or (No). The default is No. If Yes, the conference is allowed to use available unassigned ports beyond the reserved number of ports.
- **custom greeting** - (brandline), no, meeting). The default is brandline. If no, the greeting is not issued. If the entry is meeting a generic customer greeting is issued such as "Wellcome to the conference", it is advisable to include in the greeting the request that the callers enter their names.
- **name of chairperson** - Default is no name. Otherwise, the maximum name size is 20 characters.
- **name of conference** - the name or title of the conference. Default is no name. Otherwise, the maximum name size is 20 characters. Once defined, the name cannot be deleted. However, it can be changed to <BLANK> and no name will be displayed.

Example:

Define a new conference:

CRes: cr

years (1997): <cr>

month (03): <cr>

day (12): 20

Current conferences for 20/03/1997:

	Start	Duration	CDN	Char CDN	No of Ports	Name Entry	Expan- sion	Gree ting	Chair person	Title
1	08:00	04:00	2000	2001	3	yes	no	brandlin	Bob	Tech Xfer
2	12:00	03:00	2020	2021	4	no	no	no	Barry	PLM Rev
3	21:00	02:00	2030	2031	3	yes	yes	meeting	Tri	Conf

If there are no conferences scheduled for the specified day, the table would not appear and a message would indicate "There are no conferences scheduled for this day."

Modify, Insert, Delete, Exit: i

start (00:00):

duration (00:00): **02:00**

main CDN (1-2006, 2-2007, 3-2008): **2**

conferee password length (0): <cr>

chairperson CDN (1-2006, 2-2008): **1**

chairperson password length (0): **6**

number of ports (0 (4)): **4**

language(american_english, (1-french, 2-brasilian_portuguese, 3-LA_spanish, 4- UK_english)): **1**

name entry (no): **yes**

expansion (no): **yes**

customer greeting (brandline): **No (if *brandline* you get a message to record)**

name of chairperson (): **Dale**

name of conference(""): **Meeting**

Attributes of New Conference are:

start: 10:30

duration: 2:00

main CDN: 2007

conferee password: not defined

chairperson CDN: 2006

chairperson password: not defined

number of ports: 4
 language: french
 name entry: yes
 expansion: yes
 customer greeting: No (*if Yes you get a message to record*)
 name of chairperson: Dale
 name of conference: Meeting
 Modify, Save, Cancel: **Save**
 New conference has been defined.
 Current conferences for 20/11/1996:

	Start	Duration	CDN	Char CDN	No of Ports	Name Entry	Expan- sion	Gree ting	Chair person	Title
1	08:00	04:00	2000	2001	3	yes	no	brand	Bob	Tech Xfer
2	10:30	02:00	2007	2006	4	yes	yes	no	Dale	Meeting
3	12:00	03:00	2020	2021	4	no	no	no	Barry	PLM Rev
4	21:00	02:00	2030	2031	3	yes	yes	meeting	Tri	Conf

Modify, Insert, Delete, Exit: **e**
 CRes:

Help display

The following help information is displayed when help (?) command is chosen at the Conference Administration level.

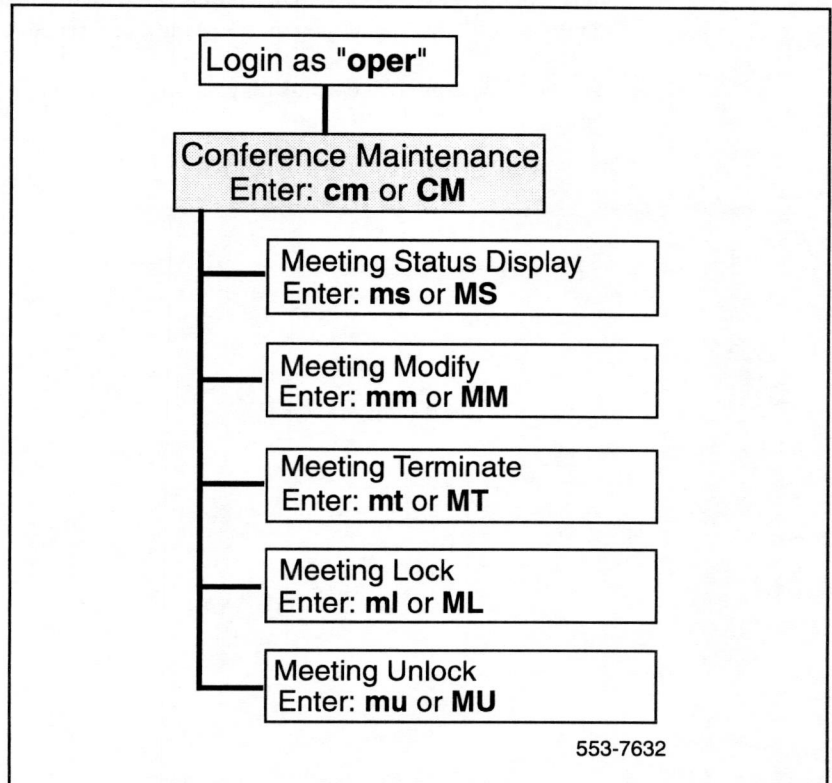
Short command	Full command	Explanation
cr	crsr	Reserve conference for specific time.

Conference Maintenance

The Conference Maintenance menu is accessed from the Main Menu after you logged in as an administrator (**admin**) or an operator (**oper**) and by entering the **cm** or **CM** or the full command (**CMaint**).

Figure 14 shows the Conference Maintenance menu and its sub-menus. These sub-menus modify active conferences, i. e. conferences that are in progress or conferences that will start within 3 minutes.

Figure 14
Conference Maintenance administration menu



Note: This menu cannot operate on conferences scheduled for future activation. It operates only on conferences in progress or those that will start within 3 minutes.

When you select Conference Maintenance menu, the system displays a list of currently active conferences, as follows:

	Start	Duration	CDN	Char CDN	No of Ports	Status	Locked	Chairper- son	Title
1	00:00	forever	2000	2001	3(3)	bridge	no		Bridge 2000
2	10:30	02:00	2007	2006	5(4)	expand	yes	Dale	Meeting
3	12:00	03:00	2020	2021	1(4)	active	no	Barry	PLM Rev
4	21:00	02:00	2030	2031	0(3)	next	no	Tri	Conf

To operate on a conference or bridge, you must select its number in the left most column of the display. The conference with the status "next" cannot be modified with this menu, you must use the Conference Administration menu.

The possible conference status may be: bridge, active, expanded, ending, failed, or next.

Meeting Status Display

This menu displays detailed information about a selected conference and its ports. Refer to Port Status Display in the Port Maintenance menu.

Example:

MStatus, MModify, MTerminate, MLock, MUnlock, ?: **ms 2**

Attributes of conference 2:

start: 10:30

duration: 02:00

main CDN: 2007

conferee password: 509873

chairperson CDN: 2006

chairperson password: 565509

number of ports: 3(4)

language: american_english

name entry: yes

expansion: yes

customer greeting: No

status: active

locked: yes

name of chairperson: Dale

name of conference: Meeting

ports:

Port_ID	Status
2	dial_in
10	chairperson
29	dial_out

	Start	Duration	CDN	char CDN	No. of Ports	Status	Locked	Chairper- son	Title
1	00:00	forever	2000	2001	3(3)	bridge	no		Bridge 2000
2	10:30	02:00	2007	2006	5(4)	expand	yes	Dale	Meeting
3	12:00	03:00	2020	2021	1(4)	active	no	Barry	PLM Rev
4	21:00	02:00	2030	2031	0(3)	next	no	Tri	Conf

MStatus, MModify, MTerminate, MLock, MUnlock, ?:

Meeting Modify

This menu can be used to modify a conference that is already active or will start within 3 minutes. It changes the number of conference ports, duration, and expansion of the conference. If you reduce the number of ports below the currently active number of ports or if you reduce the conference duration below three minutes after the current time, the system will display an error. Also, if a conference original termination is within next 3 minutes, the change cannot be made.

If an error is displayed, the system will prompt you to correct the error. If the change made the conference end within 3 minutes, the change is discarded. If the number of ports previously defined is too large, the number of ports is reduced to the maximum available during the requested time span.

Changes are in effect after executing the Save command. This command cannot be used for bridges.

Example:

```
MStatus, MModify, MTerminate, MLock, MUnlock, ?: mm 2
conference 2:
duration (02:00): 02:30
number of ports (4 (5)): 5
expansion (yes): <cr>
New attributes of conference 2 are:
duration: 2:30
number of ports: 5
expansion: yes
Modify, Save, Cancel: Save
Attributes of conference 2 have been updated.
```

	Start	Duration	CDN	char CDN	No. of Ports	Status	Locked	Chair person	Title
1	00:00	forever	2000	2001	3(3)	bridge	no		Bridge 2000
2	10:30	02:30	2007	2006	5(5)	active	no	Dale	Meeting
3	12:00	03:00	2020	2021	1(4)	active	no	Barry	PLM Rev
4	21:00	02:00	2030	2031	0(3)	next	no	Tri	Conf

```
MStatus, MModify, MTerminate, MLock, MUnlock, ?:
```

Meeting Terminate

This menu terminates a scheduled and currently active conference. All the conference participants are disconnected and ports assigned to this conference become un-assigned. This menu does not terminate a bridge. A conference that is scheduled to terminate within 3 minutes cannot be terminated using this menu.

When a conference is terminated, its duration is shortened in the reservation database to avoid reopening it in case the MICB card is reset.

Example:

MStatus, MModify, MTerminate, MLock, MUnlock, ?: **mt 3**

Terminate conference 3 ? (Yes, (No)) **Yes**

Conference 3 is being closed.

	Start	Duration	CDN	char CDN	No. of Ports	Status	Locked	Chair person	Title
1	00:00	forever	2000	2001	3(3)	bridge	no		Bridge 2000
2	10:30	02:30	2007	2006	5(5)	active	no	Barry	Meeting
3	21:00	02:00	2030	2031	0(3)	next	no	Yuval	Conf

MStatus, MModify, MTerminate, MLock, MUnlock, ?:

Meeting Lock

This menu locks a currently active conference so that potential conferees trying to access the conference are not allowed to join.

Example:

MStatus, MModify, MTerminate, MLock, MUnlock, ?: **ml 2**

Lock conference 2 ? (Yes, (No)) **Yes**

Conference 2 is being locked.

	Start	Duration	CDN	char CDN	No. of Ports	Status	Locked	Chair person	Title
1	00:00	forever	2000	2001	3(3)	bridge	no		Bridge 2000
2	10:30	02:30	2007	2006	5(5)	active	yes	Barry	Meeting
3	21:00	02:00	2030	2031	0(3)	next	no	Yuvali	Conf

MStatus, MModify, MTerminate, MLock, MUnlock, ?:

Meeting Unlock

This menu unlocks a currently active conference so that potential conferees trying to access the conference are allowed to join.

Example:

MStatus, MModify, MTerminate, MLock, MUnlock, ?: **mu 2**

Unlock conference 2 ? (Yes, (No)) **Yes**

Conference 2 is being unlocked.

	Start	Duration	CDN	char CDN	No. of Ports	Status	Locked	Chair person	Title
1	00:00	forever	2000	2001	3(3)	bridge	no		
2	10:30	02:30	2007	2006	5(5)	active	no	Barry	Bridge 2000
3	21:00	02:00	2030	2031	0(3)	next	no	Yuval	Meeting Conf

MStatus, MModify, MTerminate, MLock, MUnlock, ?:

Help display

The following help information is displayed when help (?) command is chosen at the Conference Maintenance level.

Short command	Full command	Explanation
ms	mstatus	Meeting Status Display
mm	mmodify	Meeting Modify
mt	mtterminate	Meeting Terminate
ml	mlock	Meeting Lock
mu	munlock	Meeting Unlock

Chairperson commands

The chairperson can execute commands using the telephone set to manage the features configured in the Conference Reservation menu. The chairperson becomes the person that first dials the chairperson CDN. The conference may be conducted without a chairperson. These chairperson commands can be executed only during conference.

Note: When chairperson dials out to an other MICB conference, two ports are being used, the dial out port of this MICB and the dial in port of the other conference MICB. These two ports are not automatically disconnected, therefore the chairperson must disconnect the dial out port before leaving the conference.

The chairperson's and conferee commands are listed in the Table 14 below:

Table 14
Conference commands

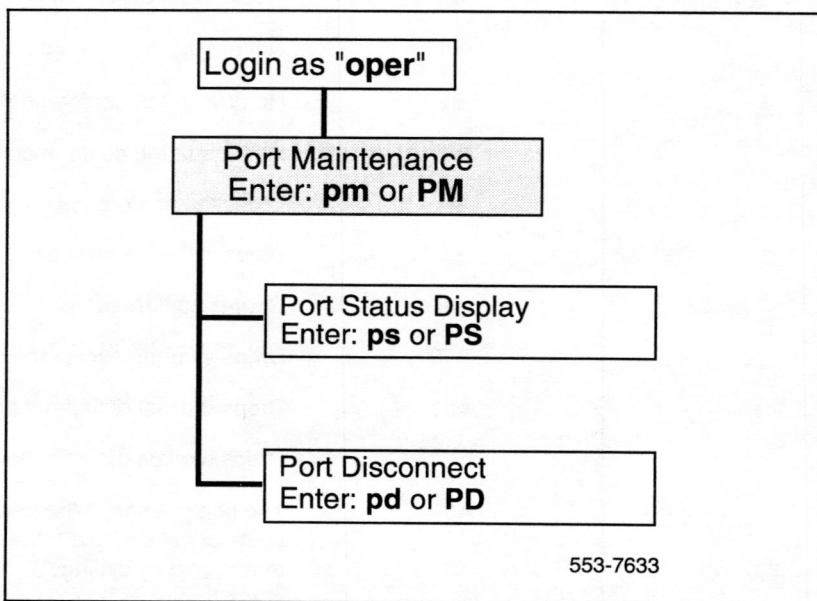
Chairperson Command	Description
*0<DN>#	Dials out to a DN (called party directory number, which may or may not be a conference participant)
*0#	Dials out to the assistant DN
*#	Redials last dialed DN
*1	Not used
*2	Returns to the conference with dialed party
*3	Returns to the conference without dialed party
*4	Locks the conference
*5	Unlocks the conference
*6	Counts conferees
*90	Drops all ports except the chairperson's port
*91	Drops the last dialed-out port
*92	Drops the last dialed-in port
*99	The chairperson, if the first to join the conference, can dial *99 and stop conference music, and by dialing *99 again, the music starts again.
Conferee Command	Description
*	First conferee that joins the conference can stop the initial conference music by dialing *, by dialing * again the music starts again.

Port Maintenance

The Port Maintenance menu is accessed from the Main Menu after you logged in as an administrator (**admin**) or an operator (**oper**) and by entering the **pm** or **PM** or the full command (**PMaint**).

Figure 15 shows the Port Maintenance menu and its sub-menus. The sub-menus display the status of the MICB ports and disconnects a specific MICB port.

Figure 15
Port Maintenance menu



Port Status Display

This menu displays the status of all MICB ports regardless of their allocation. A possible status for a port may be: Idle, Dialing_out, Ringing, Talking, and Disable.

Example:

PStatus, PDisconnect, ?: ps

Port_ID	Port_Status	Port_ID	Port_Status
0	DISABLE	16	IDLE
1	DISABLE	17	IDLE
2	IDLE	18	DIALING_OUT
3	TALKING	19	DIALING_OUT
4	TALKING	20	RINGING
5	TALKING	21	RINGING
6	IDLE	22	IDLE
7	RINGING (Note)	23	DIALING_OUT (Note)
8	TALKING	24	TALKING
9	TALKING	25	IDLE
10	TALKING	26	TALKING
11	TALKING	27	TALKING
12	IDLE	28	IDLE
13	RINGING	29	DIALING_OUT
14	TALKING	30	IDLE
15	IDLE	31	RINGING

Note: Dialing out and ringing are very short events.

PStatus, PDisconnect, ?: * (to exit)

Port Disconnect

Allows you to disconnect a specific MICB port from the conference.

Example:

PStatus, PDisconnect, ?: pd 13
 Disconnect port 13 ? (Yes, (No)) **yes**
 Port 13 has been disconnected.
 PStatus, PDisconnect, ?:

Help display

The following help information is displayed when help (?) command is chosen at the Port Maintenance level.

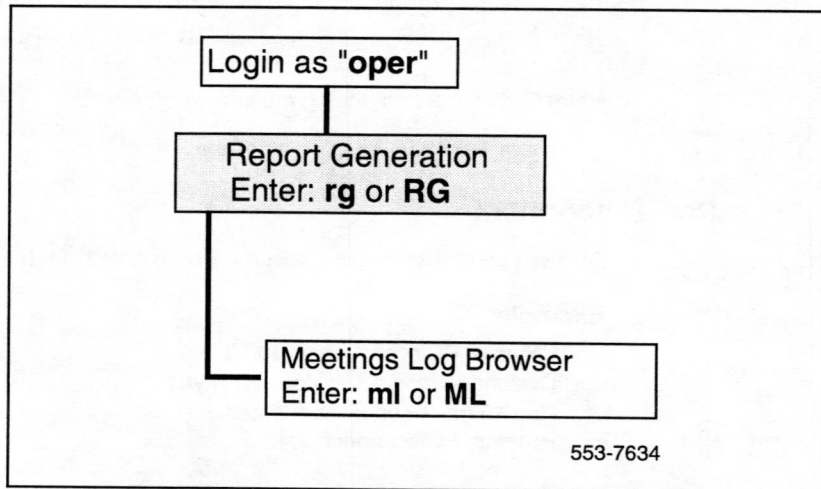
Short command	Full command	Explanation
ps	pstatus	Display Status of all Ports
pd	pdisconnect	Disconnect specified port

Report Generation

The Report Generation menu is accessed from the Main Menu after you logged in as an administrator (**admin**) or an operator (**oper**) and by entering the **rg** or **RG** or the full command (**RGen**).

Figure 16 shows the Report Generation menu used to present log of conference events for a particular date.

Figure 16
Report Generation menu



Meeting Log Browser

This menu displays a log of conference events for a specified date. After the data is displayed, the system returns to the year-month-day prompt using the last selected date as default. To exit the log, enter the "." (dot) at the prompt. If you wish to exit the log before the entire log is displayed, enter "* <cr>" (star and return).

Each event report starts with the time stamp and the main CDN in the following format

hours:minutes:seconds (CDN) <description of event>

Example:

```
MLog: ml
year (1996): 1995
month (02): 03
day (20): 15
14:55:06 (2230) opened:
```

CDN	chair-CDN	# Ports	Name_entry	Expansion	Assist_DN
2230	2001	3	yes	no	1000

```
15:00:45 (2220) expanded
15:01:00 (2220) entry: 24 //Conferee entered conference on port 24//
15:03:23 (2230) ch_entry: 4 //Chairperson joined conference on port 4//
15:03:56 (2220) exit: 14 //Conferee left conference from port 14//
16:35:09 (2230) mmi_op lock //Conference locked//
16:44:15 (2220) mmi_op unlock //Conference unlocked//
16:45:00 (2220) closed
16:56:02 (2230) ch_com dial_out: 395945 //Chairperson dials out DN//
16:57:00 (2230) ch_com return //Chair. returns without called party//
16:58:20 (2230) ch_com redial: 395945 //Chair redialed last dialed DN//
16:59:16 (2230) ch_com ret with_party //Chr return with called party//
16:58:45 (2230) ch_com count //Chairperson counts conferees//
17:00:54 (2230) mmi_op num_of_ports: 2 //New number of ports is 2//
17:01:44 (2230) mmi_op duration: 4:00 //New duration is 4 hours//
17:02:54 (2230) mmi_op expansion: yes //Port expansion is allowed//
17:03:45 (2230) ch_com lock //Chairperson locks conference//
17:05:45 (2230) ch_com unlock //Chairperson unlocks conference//
17:08:26 (2230) ch_com drop last d_in //Drop last dial in conferee//
17:08:56 (2230) ch_com drop last d_out //Drop last dial out conferee//
17:09:16 (2230) ch_com drop all //Drop all conferees//
```

The date you select to display the conference log should be in the passed not future.

Old log files are deleted after the predefined report aging time is exceeded. If there are no log files for the specified date, the system will indicate this fact.

Help display

The following help information is displayed when help (?) command is chosen at the Report Generation level.

Short command	Full command	Explanation
ml	mlog	Meeting Log Browser

Maintenance

This chapter describes Meridian Integrated Conference Bridge (MICB) maintenance tools and procedures to guide you in identifying the MICB faults, locating defective equipment, correcting problems by fixing or replacing defective equipment, and verifying the operation of the MICB after corrections or replacements have been made.

Maintenance overview

The problem identification should be approached systematically. A problem may have more than one cause. To isolate the cause, a knowledge of MICB operation is required. Once the cause is identified, the problem can be corrected by replacing the defective card, connecting accidentally disconnected cables, or correcting the software security problem.

The system and the MICB provide built-in self-diagnostic indicators and software and hardware tools. These diagnostic facilities simplify system troubleshooting and reduce mean-time-to-repair (MTTR).

This document focuses on the maintenance of the MICB equipment. It requires that system operates correctly before you start diagnosing the MICB problems. The system installation and maintenance guide documents: **Meridian general maintenance information** (553-3001-500), **Meridian 1 fault clearing** (553-3001-510), and **Meridian 1 hardware replacement** (553-3001-520) describe how to maintain the entire system. This chapter describes how to maintain the MICB as an integral part of the system.

Diagnostic tools

Diagnostic tools are used to troubleshoot problems in the system including problems with the MICB. When diagnosing MICB problems, you may have to use more than one of these tools.

System diagnostic tools consist of:

- LED indicators
- display codes
- card self-tests
- sanity monitoring
- overlay commands
- history files

MICB status LED indicator

The MICB has a card LED indicator at the top of the faceplate. The card LED is a red LED that indicates the status of the card. If the LED is ON, the card may be faulty or disabled. When the card is powered up, it blinks 3 times during self-test and then stays ON if functioning correctly, otherwise it turns ON without blinking and stays ON. The LED turns OFF when the card is software enabled.

Self-test

A self-test is automatically performed by each MICB card when you insert it into an operating system module or when you power up or reset the system. You can also perform a self-test on a card using software commands or menus.

The self-test checks general MICB functions and determines if they are operating correctly. It is very useful when you first install the cards because, upon insertion, the card automatically starts the self-test and gives you an immediate indication of its operating status.

Self-test performs a detail test and analysis of the installed hardware both to determine the integrity of the hardware and to establish the configuration of MICB card by checking the processor, the RAM capacity, the Flash memory, the DSP and etc.

Table 15
MICB self-test sequence

Item tested	Description of action
Processor/Coprocessor	Read and store processor ID. Run processor self-test.
DRAM	Check the amount of DRAM installed. Perform R/W test.
PCI Chipset	Perform R/W test on selected registers.
System I/O Controller	Perform R/W test on selected registers.
PCMCIA Controller	Perform R/W test on selected registers.
DS-30X Interface	Test shared memory and perform loopback test over SD-30 LCA.
CE-MUX Interface	Test shared memory and perform loopback test over CE-MUX LCA
PCMCIA DSP card(s)	Check the presence of DSP cards and initiate diagnostic tests on DSP cards, if present.
PCMCIA hard drive	Checks the presence of the hard drive and checks the configuration information.
PCMCIA Flash card	Check the presence of Flash memory and the MICB check configuration information.

Sanity monitoring

Sanity monitoring is a background routine that checks the operation of system

resources such as CPU activity memory allocation etc. This background routine attempts to restore normal system operation if the system performance has degraded to an unacceptable level. If all else fails, this routine will restart the system to try to restore it to normal operation. If the soft reset is not effective, a full board level reset is initiated. If reset is not successful, the maintenance LED would stay ON.

Overlay commands

Diagnostics are performed for every card as part of the daily routines, or may be invoked from a maintenance TTY or the SMP (when equipped). See the NTP titled **Meridian 1 system maintenance** (553-3001-520).

The MICB card appears as an Extended Digital Line card to a system in which it is installed. All relevant system maintenance commands for a Extended Digital Line card can therefore be used with MICB. Enabling and disabling of ACD digital telephone set M2616 is done in Overlay LD 32.

Table 16 lists some of the commands used to control the MICB status and functions.

Table 16
Commands to enable/disable MICB channels

LD 32 Commands	Operation performed
DISC / ENLC	Disable / Enable specified card
DISU / ENLU	Disable / Enable specified channel
LOOP	Performs a network memory test, continuity test, and signaling test on the specified loop.
STAT	Get status of specified card /channel
LD 30 Command	Operation performed
UNTT	Performs self-test on the MICB.

All the above commands are handled by the MICB card exactly as they are by the Extended Digital Line card, transparently to the system.

History file

Information on any fault conditions are stored on the MICB card to provide a history file for the craftsperson. The file is in the form of a cyclical buffer, which is overwritten from the top when it runs out of space. It is configured to use memory resources efficiently.

MICB fault isolation and correction

Fault clearing procedures for the MICB are the same as for other IPE cards; refer to **Meridian 1 fault clearing** (553-3001-510) for more information.

Table 17 deals specifically with MICB service problems. To diagnose these problems, the table refers you to the test procedures in this manual that will most likely be able to resolve these problems based on the symptoms these problems are exhibiting.

Table 17
MICB equipment problems

Symptoms	Diagnosis	Solution
Red card LED on the MICB is permanently on.	Card is disabled or faulty.	Go to <i>Procedure 1</i> , in this chapter to check the card status and perform self-test.
Display on the controller card shows fault codes.	Card faulty, failed self-test or problem communicating with peripheral equipment.	Go to <i>Procedures 1 and 2</i> to check self-test and self-test on reset. Also refer to <i>X11 input/output guide</i> (553-3001-400) for a list of codes.
Error messages printed on the terminal or the Meridian 1 TTY.	Hardware or software problems with the MICB.	Note various error messages. Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of these messages and their description. Based on the code's description, take the appropriate action to resolve the problem.

If you cannot resolve the problem after exhausting all available diagnostic tools and test procedures, make a list of all the symptoms you observed and contact your field service representative.

Procedure 1

MICB self-test steps

- 1 The card will self-test upon insertion.
- 2 Card LAN will poll the card.
- 3 If self-test passed, the card will send back "powered-up occurred" message.
- 4 Card LAN will request configuration data.
- 5 The card will return configuration data (card type, X12 signaling type, and TN mapping type 2).
- 6 Card LAN will enable the DS-30X signaling channel.
- 7 The MICB card will wait until it receives configuration data (trunk type, signaling type, balance impedance, etc.) via the DX-30X, but it will then discard this data.
- 8 The card will go into its main program loop.

Procedure 2

Reset MICB card command

- 1 Software will send a reset message to the card if no channels are busy.
- 2 The card will set all appropriate resources to disabled state and turn on the faceplate LED.
- 3 The MICB card will reset and self-test. Self-test results will be stored in case a later query is performed by the Meridian 1.
- 4 Card LAN will poll the card.
- 5 If self-test passes, the card will send back a message: "power-up occurred".
- 6 Card LAN will request configuration data.
- 7 The card will return configuration data (card type, X12 signaling type, and TN mapping type 2) and enable DS-30X link.
- 8 Card LAN will enable the DS-30X signaling channel.
- 9 The card will wait until it receives download configuration data (trunk type, signaling type, balance impedance, etc.) via the DS-30X, but it will then discard this data.
- 10 The card will go to its main program loop.

Card replacement

The MICB is based on PCMCIA technology. This allows you to remove the MICB from the IPE shelf indefinitely without losing the configuration data.

To replace the MICB card:

- 1 Disable the MICB card by loading the LD 32 overlay and executing the **DISC l s c** command, where **l**= loop, **s**= shelf or module, **c**= card in the module.
- 2 Remove the card from its card slot in the IPE module.
- 3 Remove all PCMCIA cards from the faulty MICB card.
- 4 Transfer all PCMCIA cards to the new MICB card.

Note: This procedure moves all software, configuration, and records to the replacement MICB card.

- 5 Transfer the Security Device from the faulty MICB to the replacement.
- 6 The keycode is reused. It is still installed on the PCMCIA card, which was removed from the faulty MICB.
- 7 Enable the new card by executing the **ENLC l s c** command.
- 8 Configure the newly installed MICB card.
- 9 Package the faulty MICB card and ship it to the repair center.

Appendix A: MMI error messages and connector pin assignments

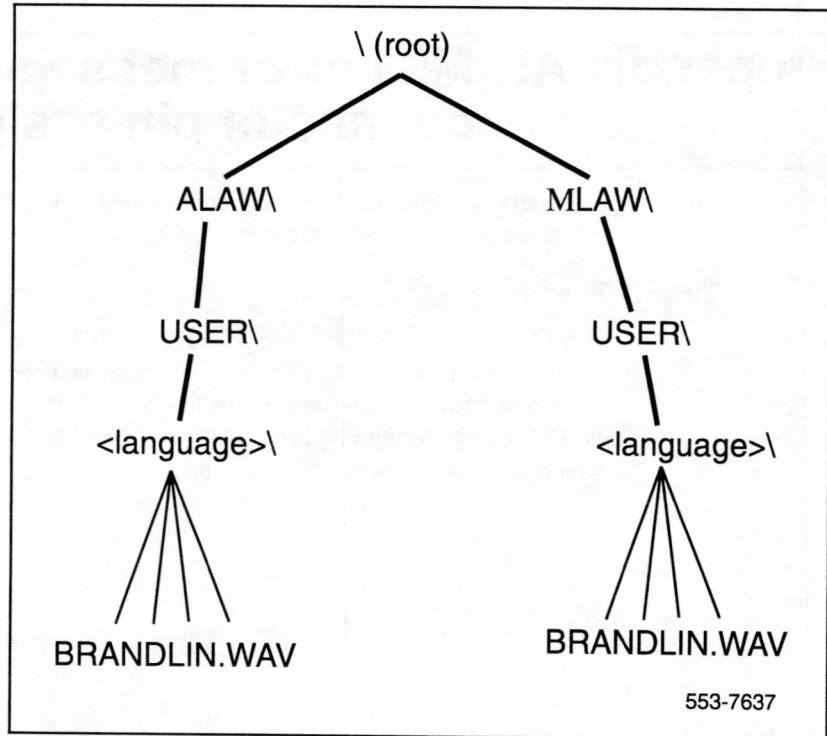
Appendix A contains the information the maintenance terminal pin assignments and the MMI error messages.

Brand line file

A BRANDLIN.WAV file is copied to the PCMCIA disk to partition A: - the voice partition. Since voice files in the database are uncompressed, they have to be converted to the desired coding law before copying to the target PCMCIA disk. Partition A: is divided into 2 directories - A-law and μ -law, to which the converted voice files are copied.

You must record a brand line greeting for each language separately and copy it to the PCMCIA disk following the directory structure shown in Figure 17.

Figure 17
PCMCIA disk audio file structure



Maintenance terminal cable pin assignments

Table 18 lists the pin assignments for the maintenance terminal cable that connects from the IPE module I/O panel connector to the nullmodem for direct terminal connection, or to a modem for a remote maintenance terminal connection.

Table 18
A0660348 Maintenance cable (Part 1 of 2)

J2 Pin Number (DB-25 pin connector)	J1 Pin Number (50-pin I/O panel connector)	Description
1	25	Reserved
2	22	RS-232 Tx
3	20	RS-232 Rx
4	18	Reserved
5	10	Reserved
6	16	Reserved
7	21	GND
8	17	Reserved
9	11	Reserved
10	24	LAN_Tx+
11	49	LAN_Tx-
12	12	Reserved
13	23	LAN_Rx+
14	48	LAN_Rx-
15	13	Reserved
16	14	Reserved
17	15	Reserved

Table 18
A0660348 Maintenance cable (Part 2 of 2)

J2 Pin Number (DB-25 pin connector)	J1 Pin Number (50-pin I/O panel connector)	Description
18	36	Reserved
19	37	Reserved
20	19	Reserved
21	38	Reserved
22	39	Reserved
23	40	Reserved
24	41	Reserved
25	N.C.	Not Connected

MMI Error Messages

These error messages are displayed on the maintenance terminal during conference events.

Table 19
MMI error messages (Part 1 of 4)

Error message text	Comments
Failure on accepting key code	Check the keycode.
Incorrect login	Enter the correct password.
Incorrect card ID entered	Check the card ID.
Wrong input type	Check the input type.
Input out of range	Specify the input within the rage.
Enter: yes, no, y or n.	Spell out yes or no.
Enter yes or no.	Enter the appropriate response.

Table 19
MMI error messages (Part 2 of 4)

Error message text	Comments
Entered string too long	Check the string length.
Wrong number of input parameters	Check input parameters.
Input should be in HH:MM format	Use the correct time format.
Invalid command for this directory	Check the directory/command.
Command not valid at this point	Check the command.
Audio recording in process, input ignored	Wait until recording is completed.
There are no reports for this date	The specified date has no reports.
Date entered must not be in the future	The date for conference maintenance must be present date.
Date entered is too far in the past	Files are deleted once their age reaches "conf log aging"
Date entered is too far in the future	Reservations can be made only 6 months in advance.
Command must be followed by a valid number.	Choose entry number according to the table presented
Voice file specified does not exist	When defining files per event
Voice file specified already exists	When recording new file
Event must have at least one associated file	Check the event and check the file table for that event.
Start time must be later than current time + 3	For a new conference scheduling.
Number of ports cannot be reduced below number of active ports. Current number of active ports: X	Number of active ports can be reduced only after they are dropped.

Table 19
MMI error messages (Part 3 of 4)

Error message text	Comments
Maximum available ports X exceeded	Used when bridges collide or when more than the maximum number of ports is defined for a conference
Number of ports requested for bridge collides with reserved conferences at the following times.	Followed by a list of colliding conferences.
A day in the past can not be modified	Check the specified date.
Maximum duration is 12 hours	Reduce the conference duration.
Meeting is active or about to open. Use Meeting Modify option for active meeting.	Modify option in Conference Reservation command.
Meeting is in the past or about to end and can not be modified.	Modify option in Conference Reservation command.
Cannot delete a meeting which started in the past or is about to start.	Delete option in Conference Reservation command.
Command is not relevant for meeting which has not yet begun.	In Conference Maintenance directory.
Command must be followed by a valid meeting number.	In Conference Maintenance directory.
This command may not be used for a bridge.	In Conference Maintenance directory.
Meeting may not be scheduled to end within 3 minutes.	In Meeting Modify command.
Meeting ended or was originally scheduled to end within 3 minutes. Duration can not be changed.	In Meeting Modify command.

Table 19
MMI error messages (Part 4 of 4)

Error message text	Comments
Conference scheduled to close within 3 min. may not be terminated.	In Meeting Terminate command, before user confirmation.
Conference closed or scheduled to close within 3 minutes. It may not be terminated.	In Meeting Terminate command, after user confirmation.
This conference begins on the previous day and can be modified only there.	A conference may be chosen for modification from the list of conferences when it begins on the day being displayed.
CDN X already appears in the list.	This Control DN is already assigned.
CDNs reserved for conferences cannot be deleted.	You would have to un-reserve the CDNs you wish to delete.
CDN entered is too long	Check the CDN.
Maximum number of CDNs is already reached	Un-assign CDNs that are not active if you wish to re-assign them.
Error occurred while recording.	You may have to re-record.
CDN provided for recording is available for 2 more minutes!	This is a warning.
Recording session terminated	End of recording is announced.
Invalid port number	Use the correct port number.

Appendix B: Product integrity

This chapter presents information about Meridian Integrated Conference Bridge (MICB) reliability, environmental specifications, and electrical regulatory standards.

Reliability

Reliability is measured by the Mean Time Between Failures (MTBF).

Mean time between failures (MTBF)

The MICB card Mean Time Between Failure (MTBF) is better than 88 years.

Environment specifications

Measurements of performance under the temperature, shock, and vibration given in the following tables were made under test conditions as described.

Temperature-related conditions

Refer to Table 20 for a display of acceptable temperature and humidity ranges for the MICB.

Table 20
MICB environmental specifications

Specification	Minimum	Maximum
<i>Normal Operation</i>		
Recommended	15° C	30° C
Relative humidity	20%	30% (non-condensing)
Absolute	10 ° C	45° C
Relative humidity	20% to	80% (non-condensing)
Rate of change	Less than 1° C per 3 minutes	
<i>Storage</i>		
Long Term	-20° C	60° C
Relative Humidity	5%	95% (non-condensing)
	-40° C to 70° C, non-condensing	
Short Term (less than 72 hr)	-40° C	70° C
<i>Temperature Shock</i>		
In 3 minutes	-40° C	25° C
In 3 minutes	70° C	25° C
	-40° to 70° C, non-condensing	

Electrical regulatory standards

The following three tables list the safety and electro-magnetic compatibility regulatory standards for the MICB, listed by geographic region. Specifications for the MICB meet or exceed the standards listed in these regulations.

Safety

Table 21 provides a list of safety regulations met by the MICB, along with the type of regulation and the country/region covered by each regulation.

Table 21
Safety regulations

Regulation Identifier	Regulatory Agency
UL 1459	Safety, United States, CALA
CSA 22.2 225	Safety, Canada
EN 41003	Safety, International Telecom
EN 70950/IEC 950	Safety, International
BAKOM SR 784.103.12/4.1/1	EMC/Safety (Switzerland)
AS3260, TS001 - TS004, TS006	Safety/Network (Australia)
JATE	Safety/Network (Japan)

Electro-magnetic compatibility (EMC)

Table 22 lists electro-magnetic emissions regulations met by the MICB card, along with the country's standard that lists each regulation.

Table 22
Electro-Magnetic Emissions

Regulation Identifier	Regulatory Agency
FCC part 15 Class A	United States Radiated Emissions
CSA C108.8	Canada Radiated Emissions
EN50081-1	European Community Generic Emission Standard
EN55022/CISPR 22 CLASS B	Radiated Emissions (Basic Std.)
BAKOM SR 784.103.12/4.1/1	EMC/Safety (Switzerland)
SS-447-20-22	Sweden EMC standard
AS/NZS 3548	EMC (Australia/New Zealand)
NFC 98020	France EMC standard

Table 23 lists electro-magnetic immunity regulations met by the MICB card, along with the country's standard that lists each regulation.

Table 23
Electro-Magnetic Immunity

Regulation Identifier	Regulatory Agency
CISPR 22 Sec. 20 Class B	I/O conducted noise
IEC 801-2 (level 4)	ESD (Basic Standard)
IEC 801-3 (level 2)	Radiated Immunity (Basic Standard)
IEC 801-4 (level 3)	Fast transient/Burst Immunity (Basic Standard)
IEC 801-5 (level 4, preliminary)	Surge Immunity (Basic Standard)
IEC 801-6 (preliminary)	Conducted Disturbances (Basic Standard)
BAKOM SR 784.103.12/4.1/1	EMC/Safety (Switzerland)
SS-447-20-22	Sweden EMC standard
AS/NZS 3548I	EMC (Australia/New Zealand)
NFC 98020	France EMC standard

List of Terms

ACD

Automatic Call Distribution.

ACD DN

Automatic Call Distribution Directory Number (pilot DN of an ACD queue).

ASIC

Application-Specific Integrated Circuit. A microprocessor chip designed to do specific tasks; providing graphics capability is one such task.

BIOS

Basic Input/Output System. A set of permanently stored program outlines in buffers that allow software to interact with hardware components (e.g., keyboard) in a device-independent manner.

CDN

Control DN for conference and chairperson access.

CE

Common Equipment.

CE-MUX

Common Equipment bus with MULTipleXed address and data.

CO

Central Office.

CCITT

The International Telegraph and Telephone Consultative Committee.

CPE

Customer Premise Equipment. Equipment that resides on a customer's premises and is controlled by the customer as opposed to the Central Office

CPU

Central Processing Unit. A chip that performs logic, control, and arithmetic functions. The part of the switch that performs these functions and any others needed to carry out call processing.

CRT

Terminal.

CSA

Canadian Standards Association.

dB

Decibel.

dBm

Decibel with reference to Miliwatt.

DID

Direct Inward Dial trunk.

DMA

Direct Memory Access.

DN

Directory Number.

DIN

A German manufacturer of electronic devices for interconnection and other purposes.

DS-30X

Parallel serial transmission from a superloop (XNET) card to a Controller Card in an IPE shelf.

DRAM

Dynamic Random Access Memory. A type of semi-conductor memory that is characterized by its high density (smaller packages for a given amount of memory). It typically has slower access time as compared with SRAM and requires external memory refresh circuitry.

DSP

Digital Signal Processing. A specialized computer chip that performs speedy and complex operations on digitized waveforms. Useful in processing sound and video.

DTMF

Dual Tone Multi-Frequency. A term describing push-button or touch-tone dialing.

EAR

Enhanced ACD Routing.

EEPROM

Electrically Erasable Programmable Read Only Memory device.

EMC

Electro-Magnetic Compatibility. Refers to equipment units that are collectively performing each of their functions without causing or suffering unacceptable degradation due to electromagnetic interference from other equipment/systems in the same environment.

EMI

(ElectroMagnetic Interference) - Unwanted electromagnetic coupling, such as a ham radio heard on an electric organ or church music heard in hearing aids. Also known as "static".

EPLD

Erasable Programmable Logic Device. An electronic device for performing logical operations that can easily be erased and reprogrammed.

ESD

Electro-Static Discharge.

ESS

Environmental Stress Screening

EST

Environmental Stress Testing.

EXUT

Enhanced Universal Trunk card.

Field programmable

A program to which changes can be made while it is installed.

FCC

Federal Communication Commission.

Firmware

Hardwired logic, software, data, and programming instructions such as that stored by threading wires through ferrite cores. May also refer to software programmed in the factory or burnt in in the field, and is semipermanently stored within ROM.

Flash memory

Electrically erasable memory that is non-volatile (not affected by power disruptions).

FPGA

Field Programmable Gate Array.

HI

Host Interface- DSP to MPU

ID

Identification.

IDE

Integrated Drive Electronics. A low-cost hard disk drive interface.

IPE

Intelligent Peripheral Equipment - A range of cards that contain micro-processors that provide off-loading of the CPU function and the flexibility to make changes to the system's parameters without revising the hardware.

IVR

Interactive Voice Response. An application that allows telephone callers to interact with a host computer via pre-recorded messages and prompts.

Kernel

That part of a computer's operating system that performs basic functions like switching between tasks.

LED

Light Emitting Diode.

Loader

A device that moves a program or data from a floppy or hard disk and stores it into a computer's RAM memory.

MINT

Message INTerrupt. This occurs when a message being transmitted receives an interrupt signal from an outside device, which must process a task of its own. Then the transmission of the original message can resume, or be resent.

M1

Meridian 1 switch.

MMail

Meridian Mail. Nortel's proprietary voice processing platform.

MMI

Man-Machine Interface.

MPU

Microprocessor Unit in the MICB card.

MTBF

Mean Time Between Failure. A measure of reliability: the time that a user may reasonably expect a device or system to work before an incapacitating fault occurs. Also, the average number of hours between one random failure and the next under stated conditions.

MTTR

Mean Time To Repair. The average time required for corrective maintenance.

MWI

Message Waiting Indicator; a lamp or other visual display on a telephone set that informs the user that one or more messages have been left in the user's voice box.

NTP

Northern Telecom Publications; customer documentation. Each NTP is identified by a unique ten-digit publication number.

OA&M

Operations, Administration, and Maintenance.

OEM

Original Equipment Manufacturers

OTP

One-Time Programmable. Name given to a type of PCMCIA card.

PAS

Product Administration System.

PBX

Private Branch eXchange. A telephony switch that is privately owned.

PCB

Printed Circuit Board.

PCM

Pulse Code Modulation. A method for encoding an analog voice signal into a digital bit stream.

PCMCIA

Personal Computer Memory Card International Association. This organization has defined a credit card sized plug-in board for use in PCs. These cards are the only way to get to a laptop bus without using a docking station. In addition, application software can be stored on the card into system address space so that the software can run directly from the card, resulting in a faster start and less memory required from the host computer.

PRS

Problem Reporting System. A procedure followed by Nortel when customers (internal or external) find an error and file a Problem Report form with a committee that manages the PR System. The committee determines who should receive the report, and then this individual or team must "clear the PR" by describing or demonstrating how the problem was addressed.

RTC

Real Time Clock. System clocking influenced/determined by connection to a time process external to processing by the system.

SBC

Sub-Band Coding. Algorithm used by Meridian Mail and NGen for compressing speech data down to just over a quarter of its original size.

Scalable architecture

A way of designing a system that allows it to be resized with relative ease; the cost required to increase its size in proportion to the new size.

SCSA

Signal Computing System Architecture. A generalized open-system architecture describing the components and specifying the interfaces for a signal processing system for PC-based voice processing, call processing, and telecom switching.

SCSI

Small Computer System Interface. A device that enables computers to cable-connect to networks or external tape units/hard drives.

SDI

Serial Data Interface. For some Meridian switches, provides ports between the CPU and external devices like a teletype or maintenance telephone. More generally, an SDI is a mechanism for changing the parallel arrangement of data within computers to the serial form used on transmission lines, and vice versa.

SL-1

Generic term given to Nortel digital switches. Meridian 1 refers specifically to the current series of Nortel PBX's

SMP

System Management Project/Product. An OA&M GUI interface to Nortel switches now being developed.

STA

Single Terminal Access.

VGA

Video Graphics Adapter. A computer adapter that provides high resolution graphics and 256 colors.

UART

Universal Asynchronous Receiver/Transmitter.

UI

User Interface.

.WAV

File format used for storing voice files created under Microsoft Windows.

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Meridian 1

Meridian Integrated Conference Bridge

Description, installation,
administration, and maintenance

P0857603

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TRANSMISSION
TESTING
553-2001-325

Meridian 1

Transmission testing capabilities

Description and operation

Document Number: 553-2001-325

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About this document

This document describes the tie trunk transmission testing capabilities available on Meridian 1 systems equipped with Generic X11 release 2 and later. The transmission testing capabilities are the following:

- a 100 test-line termination
- a software loop-around termination

These capabilities enable the transmission performance of tie trunks to be measured and maintained at acceptable performance levels. The tie trunk transmission testing capabilities are of particular value for Meridian 1 systems equipped with the Network Alternate Route Selection (NARS), Basic Alternate Route Selection (BARS), or Coordinated Dialing Plan (CDP) features, where tie trunks are used extensively to interconnect systems.

Reference documentation

- *Electronic Switched Network signaling guidelines* (309-3001-180)
- *Electronic Switched Network transmission guidelines* (309-3001-181)
- *Summary of transmission parameters* (553-2201-182)
- *QPC237 4-Wire E&M/DX Trunk Card description* (553-2001-190)
- *Basic and Network Alternate Route Selection description* (553-2751-100)
- *Coordinated Dialing Plan description* (553-2751-102)

Test procedures

100 test-line termination

The 100 test-line termination allows access to a Meridian 1 termination that provides 5.5 seconds of 1020-Hz tone, followed by a quiet (balance) termination. The tone and quiet terminations are provided by the tone and digit switch (TDS) circuit card (all codes and vintages).

The termination can be accessed at a remote location from a local location to obtain loss and noise measurements on outgoing or two-way 2-wire (QPC71) and 4-wire (QPC237) E&M tie trunks.

The QPC71 and QPC237 trunk cards provide either 600 or 900 ohms termination, selectable by the appropriate cross-connection at the distribution frame. See *QPC237 4-Wire E&M/DX Trunk Card description* (553-2001-190) for a full description of the QPC71 and QPC237.

The 100 test-line termination is assigned a unique maintenance Directory Number (DN) at a Meridian 1 system equipped with the 100 test-line termination. Only one maintenance DN may be assigned for the 100 test-line at any one system.

Access to the termination at a remote location is gained by dialing the maintenance DN assigned to the termination. (Ringback tone is not provided to the caller for such a call.) Connection to the termination, once established, remains until the caller goes on-hook or the test-line time limit of 30 minutes has expired. Access to test-line terminations at a Meridian 1 is limited to incoming trunk calls. A network call from any far-end station to a maintenance DN is treated as a normal call by the system. The number of termination connections is limited to four. Overflow tone is provided if the termination cannot be accessed.

Unless performed from an attendant console, a specific trunk to the 100 test-line termination at a remote location cannot be selected. The attendant can select a specific trunk to the termination at a remote system, using the Barge-In key. The attendant at the terminating end cannot barge in on a trunk currently connected to the termination.

When the termination is accessed at a remote location through dial access, the echo suppressors on the trunk circuit at the remote location are switched out. At the originating Meridian 1 system, the echo suppressors are configured as for a normal trunk call. The pad switching, on trunks connected to the termination at a remote location, cannot be controlled from the originating end. (The pad is switched in during the 5.5 seconds of 1020-Hz test tone and is then switched out for quiet termination.)

Procedure 1 outlines the procedures for testing transmission levels (tone) and noise levels (quiet). These tests are performed for the following purposes:

- to identify faulty circuits or facilities
- to ensure that transmission parameters on newly installed tie trunk circuits are within acceptable limits before the circuits are put into service
- to provide routine preventive maintenance so that changes in transmission parameters can be detected and corrected before transmission performance is hindered
- to support the repair of tie trunk problems

Procedure 1 is to be performed at each end of a tie trunk to ensure that both directions of transmission are checked.

Procedure 1
Using the 100 test-line

An attendant console equipped with a Barge-In key is recommended for this test, since the trunk used for the test cannot be specified with other station equipment.

- 1 Press an idle LPK key.
- 2 Press the Barge-In key.
- 3 First dial the trunk-access code, then the member number of the trunk to be tested, and then press the octothorpe (#) key. A dial tone is heard.
- 4 Dial the DN of the 100 test-line at the far end. When the test connection is made, a 1020-Hz test tone is heard for 5.5 seconds, and then quiet termination is established.

Transmission level tests

During the 5.5 seconds of 1020-Hz test tone, transmission level tests should be performed as follows:

- 5 At the near end (see Figure 1), connect a transmission level meter to the "facility in" access jack of the trunk transmission interface and measure the level of the 1020-Hz test tone. Table 2 lists the minimum and maximum level requirements for trunks with various degrees of design loss, based on switched out echo suppression and switched-in pads on the far end.

If the measurement obtained is not within an acceptable range, access the local test-line termination at site B and measure the transmission level at the "facility out" access jack of the trunk transmission interface (see Figure 2). Acceptable levels, based on switched-in pad mode at the near end, are the following:

- QPC71: -15 dBm minimum, -13 dBm maximum
- QPC237: -15.5 dBm minimum, -13.5 dBm maximum

If the measured level is not acceptable at either (or both) site A or B, corrective maintenance must be performed at the appropriate site and the test must be repeated.

If the measured level is acceptable at both site A and site B, corrective maintenance must be performed on the transmission interface facilities or on the local 2W-4W E&M trunk.

Noise measurements

- 6 During the quiet termination, connect a noise level meter to the "facility in" access jack of the trunk transmission interface and measure the noise level of the quiet termination. Table 1 lists noise level measurements that require maintenance action.

If the measurement obtained indicates that maintenance action is required, access the 100 test-line termination at site B (see Figure 2) and measure the noise level at the "facility out" access jack of the trunk transmission interface. The requirement is that the noise level not exceed 23 dB_{rnC}.

If the requirement is not met at either (or both) site A or site B, corrective maintenance must be performed at the appropriate site and the test must be repeated.

- 7 If the requirement is met at both site A and site B, corrective maintenance must be performed on the transmission interface facilities or on the local 2W-4W E&M trunk.

Table 1
Maintenance parameter for noise measurements

Distance (miles)			Distance (km)			Noise level (dB _{rnC})		
0	—	15	0	—	24	28	—	35
16	—	50	26	—	80	28	—	35
51	—	100	82	—	160	29	—	35
101	—	200	162	—	320	31	—	35
201	—	400	322	—	640	33	—	39
401	—	1000	642	—	1600	35	—	39
1001	—	1500	1602	—	2400	36	—	39
1502	—	2500	2402	—	4000	39	—	43
2501	—	4000	4002	—	6400	41	—	45

Note 1: No corrective action is required if noise measurements are below these levels.

Note 2: Trunk maintenance can be performed with the trunk in service for measurements within these ranges. If measurements exceed these ranges, remove trunk from service before initiating corrective procedures.

Figure 1
A typical 100 test-line termination configuration

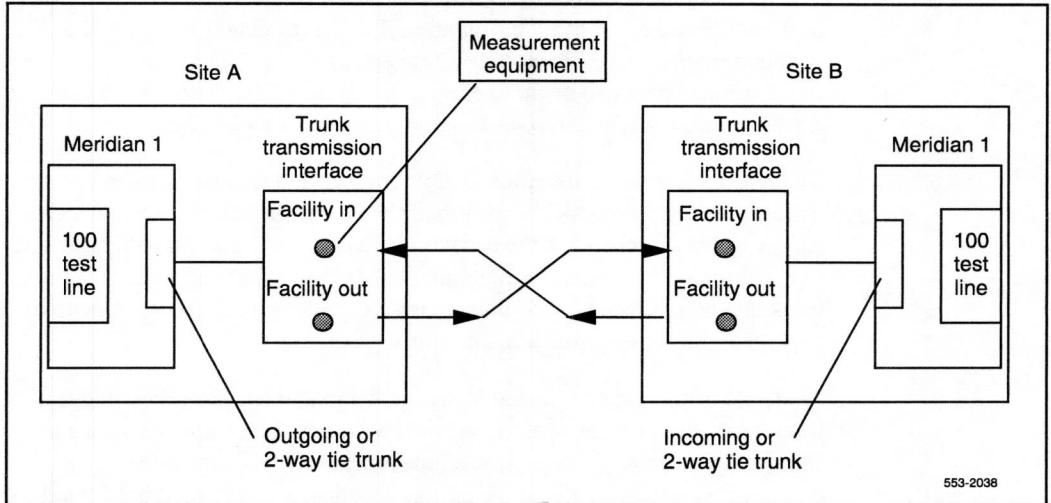
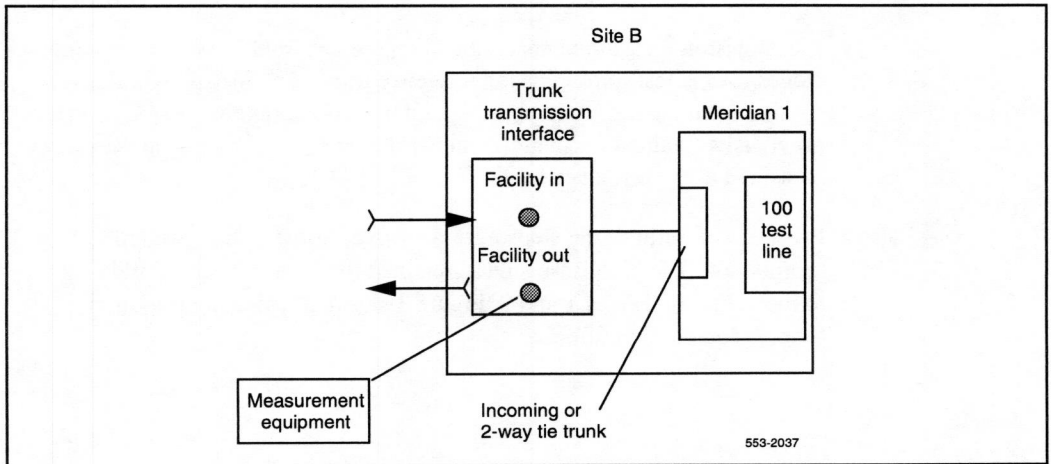


Figure 2
Local 100 test-line access



Loop-around termination

The loop-around termination is two separate terminations: a reference trunk termination and a test trunk termination. Each termination is assigned a different maintenance DN at the system arranged for the loop-around termination. There can be up to eight maintenance DNs (four for reference trunks and four for test trunks) assigned in a Meridian 1 system.

The reference trunk termination is dial accessed at a remote location through a selected trunk at the local end. When the termination is accessed, the echo suppressor is switched out, the pad is switched in, and a constant 1020-Hz test tone is provided from the termination. The transmission parameters of the trunk are then measured and adjustments are made to bring the trunk up to the specified grade-of-service transmission requirements.

A second trunk is then selected at the local end and used to access the test trunk termination at the remote location. When the test trunk termination is accessed, the constant 1020-Hz test tone is removed from the reference trunk, and a software connection at the remote location is established between the reference trunk and the test trunk, thus completing the loop-around termination. Echo suppressors are switched out and pads are configured as for a normal call.

Transmission measurements obtained on the test trunk reflect the loss/noise values for the test trunk plus the reference trunk. The loss/noise values applicable to the test trunk are obtained by subtracting the loss/noise values previously obtained for the reference trunk from the total loss/noise values measured at the reference trunk.

Procedure 2 outlines the steps necessary to establish a loop-around termination. The loss/noise values obtained for the test trunk should conform to the values of Tables 1 and 2. Figure 3 shows a typical loop-around termination configuration.

Procedure 2
Establishing a loop-around test termination

An attendant console equipped with a Barge-In key is recommended for this test, since the trunk used for the test cannot be specified with other station equipment.

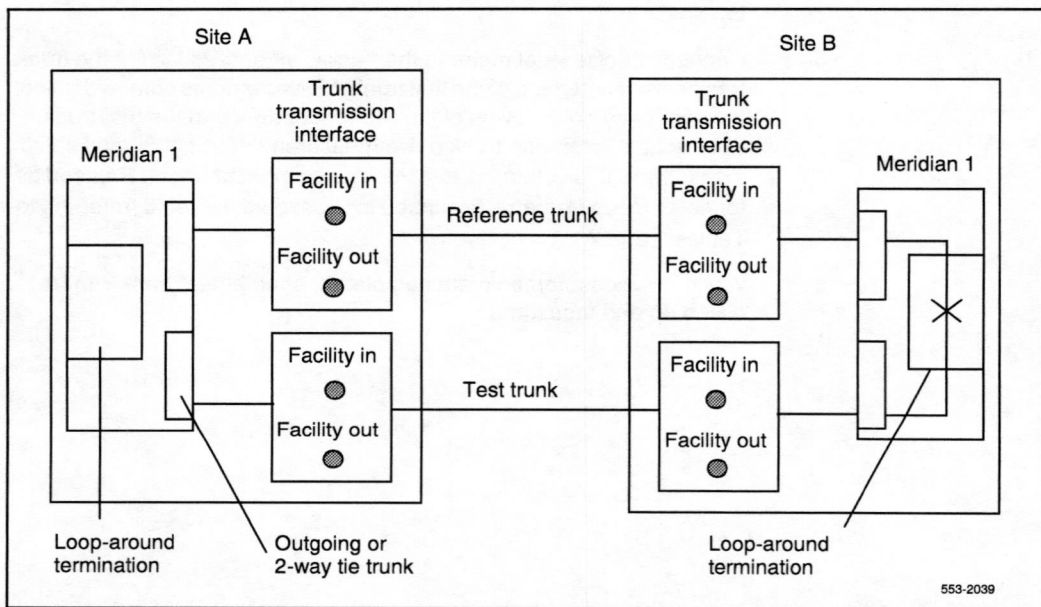
- 1** From the local end, access the reference trunk termination at the far end by performing steps 1 through 4 of Procedure 1, dialing the reference trunk loop-around termination. The 1020-Hz test tone is heard.
- 2** Measure the trunk parameters of the reference trunk, and bring them up to specification as outlined in steps 5 and 6 of Procedure 1 and in Tables 1 and 2.
- 3** Put the trunk on hold by pressing the Hold key at the attendant console.
- 4** At the attendant console, access the test trunk and connect it to the far end test trunk termination in the same way as the reference trunk, but by dialing the test trunk termination DN instead of the reference trunk termination DN.
- 5** Connect a noise level meter to the "facility in" access jack of the trunk transmission interface of the test trunk. Measurements obtained reflect the combined noise levels of the reference trunk and the test trunk. Subtract the reference trunk noise measurement from the total noise measurement to obtain the test trunk noise measurement. Proceed as for noise measurements described in Procedure 1, step 6, referring to Tables 1 and 2.
- 6** When the measurements are completed, another test trunk can be dialed up and measured.

Table 2
Transmission level parameters

Trunk design loss	Minimum level (dBm)	Maximum level (dBm)
0	-17.5	-11.5
0.5	-18.0	-12.0
1.0	-18.5	-12.5
1.5	-19.0	-13.0
2.0	-19.5	-13.5
2.5	-20.0	-14.0
3.0	-20.5	-14.5
3.5	-21.0	-15.0

Note: Values shown in the table are based on measurements obtained at the near-end trunk with pads switched in at the far-end trunk.

Figure 3
Typical loop-around termination configuration



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Meridian 1

Transmission testing capabilities

Description and operation

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BIX*

In-Building Cross-Connect System Material Description

Publication number: 631-4511-100

Document Status: Standard

Date: 86 01 17

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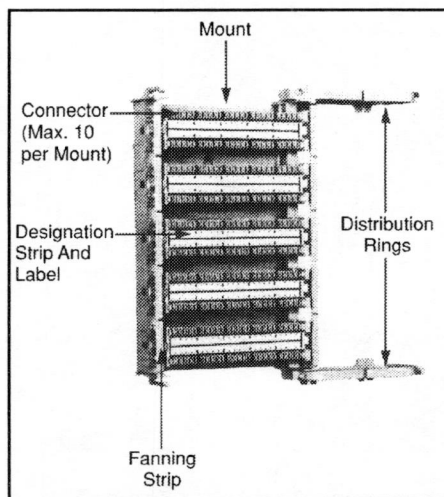
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Reason for Reissue: The practice is reissued to add information for the QMBIX 10 and 31 mounts. Changes are shown by arrowheads or bracketing arrows in the page margins.

General

- 1.01 This practice gives the material description of the BIX in-building cross-connect system.
- 1.02 The BIX system is a modular cross-connect system for in-building use only. It is designed for use in commercial, industrial, institutional, and multi-residential buildings.
- 1.03 A BIX module (Fig. 1-1) consists of a mount, ten BIX connectors, and five designation strips with the associated colored designation labels. Distribution rings are used for the vertical and horizontal jumper wire channel arrangements, and for cable distribution.

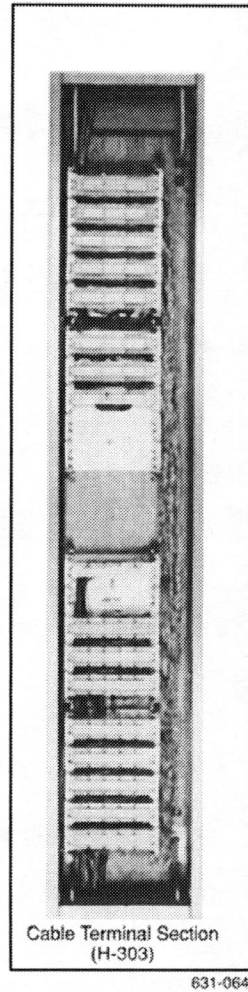
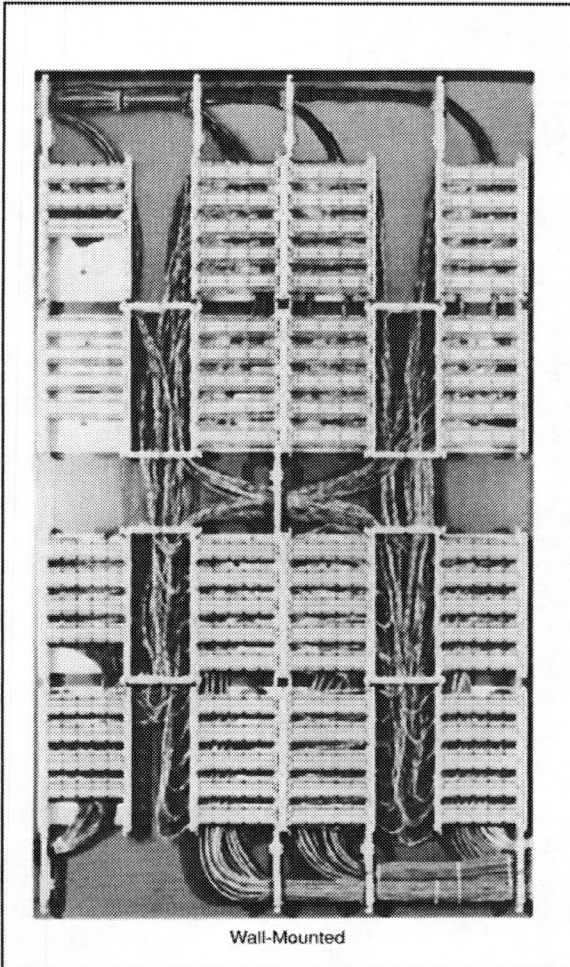
Fig 1-1
BIX System Module



631-063

- 1.04 BIX modules can be wall-mounted without the need for enclosures as electrical live parts are not exposed. To protect against physical damage, or for security or aesthetic reasons, BIX modules should be installed in closets, 'T' cabinets, or cable terminal sections (Fig. 1-2).
- 1.05 BIX modules should be suitably protected at locations where extreme physical conditions, such as vibration, temperature, humidity, dust or corrosive fumes, are encountered.
- 1.06 References
 - : 631-4511-150 BIX In-Building Cross-connect System. Planning and Application.
 - 631-4511-200 BIX In-Building Cross-connect System. Material Installation and Servicing (Wall-Mounted System).

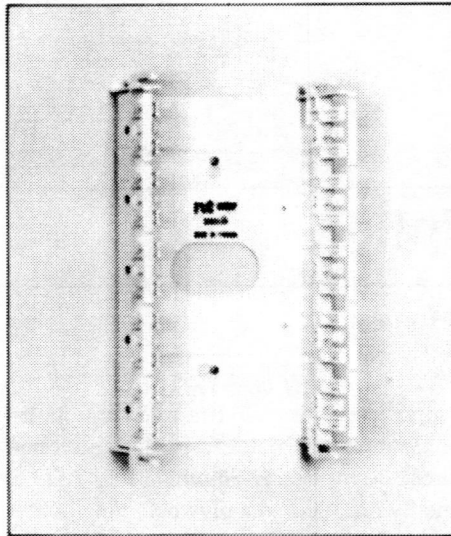
Fig 1-2
Typical BIX Modular Installations



Material Description

BASIC ASSEMBLY

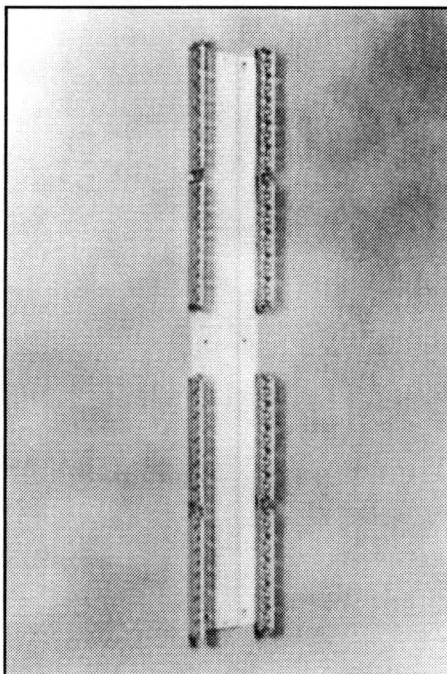
- 2.01 *QMBIX10A Mount (Fig. 2-1).* The QMBIX10A mount consists of a sheet-metal base with two fire-retardant plastic fanning strips. The mount has mounting holes for wall-, and frame-mounting, and measures 330 by 194 by 76 mm (13 by 7 5/8 by 3 inches). A mount is normally installed on a plywood panel, but it may also be installed on any reasonably flat surface by using the appropriate fasteners.
- 2.02 The mount holds a maximum of ten BIX connectors and five designation strips, which are secured by plastic retainers on the fanning strips. The maximum cable capacity of a mount is:
- Ten 25-pair “D” inside wiring cables terminated in the mount (250 pairs), and
 - Ten 25-pair “D” inside wiring cables routed through the mount (250 pairs) or
 - Equivalent pairs of other cable types.

Fig 2.1 QMBIX10A Mount

631-065

- : 2.03 ***QMBIX10B Mount Assembly (Fig. 2-2).*** The QMBIX10B mount assembly is equivalent to four BIX mounts. The mount assembly consists of sheet metal base with the retardant plastic fanning strips attached. The mount assembly has six mounting holes and measures 1422 by 194 by 79 mm (56 by 7-5/8 by 3-1/8 inches). A mount assembly can be installed on any reasonably flat surface using the appropriate fasteners.
- : 2.04 The mount assembly is divided into an upper and a lower section. Space is provided at the center of the mount assembly for a single width horizontal jumper channel. The upper and lower sections have a maximum terminating capacity of 20 connectors each.
- : 2.05 The mount assembly is for use in H303 terminal sections and in apparatus and satellite closets. When the mount assembly is used in a single H303 terminal section, the wooden backboard is not required as the mounting holes in the mount assembly match the threaded holes in the H303 terminal section. When more than one H303 terminal section is used with mount assemblies, wooden backboards must be used to allow for proper jumper channel spacing. Due to the capacity of the horizontal jumper channel, the maximum number of mount assemblies per cross-connecting field should not exceed six.

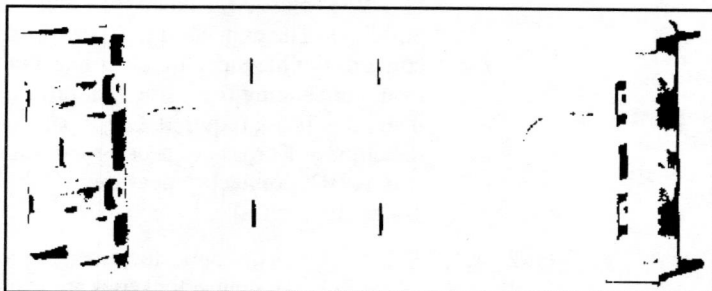
Fig 2.2
: QMBIX10B Mount Assembly



631-066

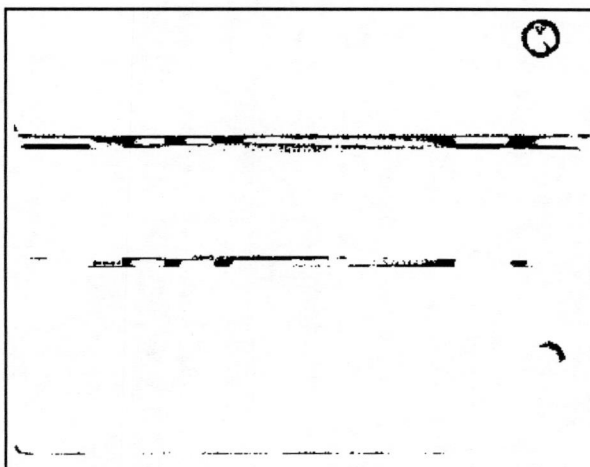
- 2.06 ***QMBIX10C Mount (Fig. 2-3).*** The QMBIX10C mount assembly consists of a sheet metal base equipped with two fire-retardant plastic fanning strips. The assembly measures 200 x 90 by 55 mm (78-3/4 x 3-1/2 x 2-1/4 inches) and may be mounted on any reasonably flat surface (wall or frame mounting).
- 2.07 The mount holds a maximum of two BIX connectors of any type and one designation strip. The fanning strips on both sides of the base incorporate snap fasteners which ensure positive locking of the connectors and the designation strips. The maximum cable capacity is:
- two 25-pair "D" inside wiring cables terminated in the mount (50 pairs), and
 - two 25-pair "D" inside wiring cables routed through the mount (50 pairs), or
 - equivalent pairs of other cable types.

Fig 2.3
QMBIX10C Mount



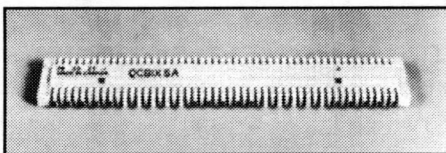
- 2.08 ***QMBIX31A Mount*** (Fig. 2-4). The QMBIX31A mount assembly is a QMBIX10C mount equipped with a fire-retardant plastic, integrated hinged cover. Dimensions are 235 x 85 x 60 mm (9-1/4 x 3-1/2 x 2-1/4 inches). This cover has a locking device, which hooks under the right hand side fanning strip. An NSQ 2000 L1 tool is used to operate the locking device. The eight cable entries (four on the top and four on the bottom) on the cover accepts up to two 25-pair and two 50-pair through cables (22, 24, and 26 AWG), or the equivalent.
- 2.09 ***QMBIX31B Mount*** (Fig. 2-4). The QMBIX31B mount assembly is identical to the QMBIX31A mount except for the cover which only snaps on the right hand side fanning strip (there is no locking device).

Fig 2.4
QMBIX31B Mount



- 2.10 **QCBIX-Type Connectors** (Fig. 2-5). BIX connectors are intended for use with 0.4, 0.5 and 0.63 mm conductor diameter (22, 24 and 26 AWG) plastic-insulated wire and cable normally used in buildings. The connector is made of fire-retardant plastic and contains double-sided quick-connect clips. The clips have an insulation slicing feature so that prior removal of the plastic insulation is not required. Cable pairs are terminated at one end of the clips, and cross-connecting wires are terminated at the other end. A BIX connector measures 168 by 32 by 10 mm (6-5/8 by 1-1/4 by 3/8 inches).
- 2.11 The five types of connectors used in the BIX system are given in Table 2-A. All connector types are symmetrical, and are identified by the product code number stamped on the connector, and by the markings on the front and back edge of the connector (Fig. 2-6). The product code indicates the internal bridging arrangement of the clips.

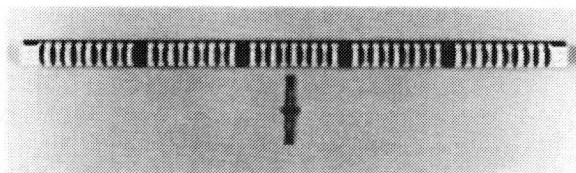
Fig 2.5
Typical QCBIX-Type Connector



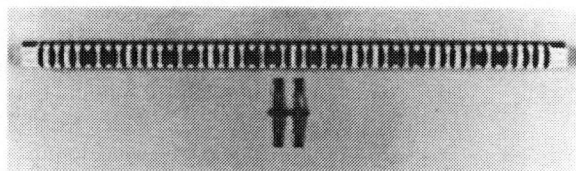
631-067

Fig 2.6
BIX Connectors, Product Code and Edge Marking

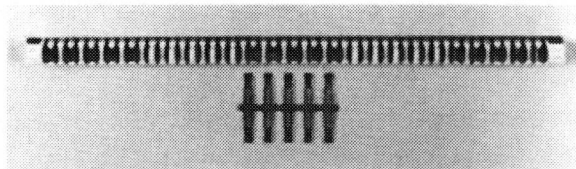
QCBIX1A
Distribution
Connector



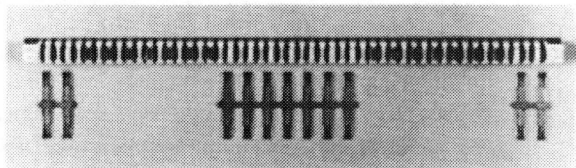
QCBIX2A
Bridging
Connector



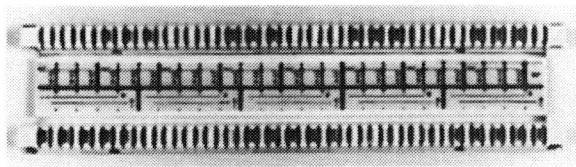
QCBIX5A
Multipling
Connector



QCBIX7A
Key Apparatus
Connector



QCBIX9A
Diode
Connector



631-068

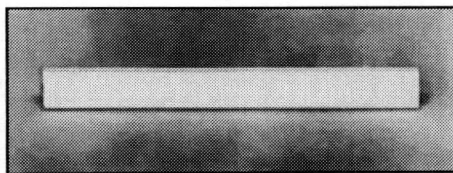
- 2.12 ***QCBIX1A Distribution Connector*** (Table 2-A). has 25 separate pairs of clips for single pair termination. The 1A connector is typically used for terminating PIC cable and station cable. The connector is marked to indicate 5-pair groups for ease of pair identification and to assist in their termination of colour-coded cables.
- 2.13 ***QCBIX2A Bridging Connector*** (Table 2-A) has 12 pairs of clips bridged in groups of two (typically one pair in, and two pairs out). The -2A connector is intended for multipling. The single pair at the center of the connector (pair 13) is not normally used. Alternate pairs on either side of the center pair are marked for ease of identification.
- 2.14 ***QCBIX5A Multiple Connector*** (Table 2-A) has 5 pairs of clips bridged in groups of five (typically one pair in, and one to five pairs out). The -5A connector is intended for making multiple connections, or for terminating tie cables in satellite closets. Alternate groups of five are marked in black for ease of pair identification.
- 2.15 ***QCBIX7A Key Apparatus Connector*** (Table 2-A) has 3 pairs of clips bridged in groups of seven and 2 pairs of clips bridged in groups of two. The -7A connector accommodates the wiring from one line of key equipment (provides two appearances of T R and B RC and seven appearances of T1 R1, A A1 and LG L leads). The connector is marked to indicate the two and seven pair groupings.
- 2.16 ***QCBIX9A Diode Connector*** (Table 2-A) occupies a pair of connector positions in the BIX mount or the mount assembly. The diode connector is made up of a special connector, and a QCBIX5A connector fastened together. On the special connector, the Tip clips are internally strapped in groups of three. The diode connector has 24 diodes factory-wired in eight groups of three diodes each. Groups of diodes can be field-strapped together to increase the number of lines connected to any common ringer. The common ringers and ringing leads are field-connected to the QCBIX5A connector. The diode connector comes equipped with a designation strip and a preprinted label.

Table 2-A
BIX Connectors

PRODUCT CODE	DESCRIPTION	TERMINATING CAPACITY	CLIP ARRANGEMENT
QCBIX1A	Distribution	25-pair	111----111
QCBIX2A	Bridging	Twelve 2-pair and one pair	222222122222
QCBIX5A	Multipling	Five 5-pair	5 5 5 5 5
QCBIX7A	Key Apparatus	Two 2-pair and three 7-pair	2 7 7 7 2
QCBIX9A	Diode	Eight ringer circuits	Special

- 2.17 On all BIX connectors, the wire slots on the front and back provide wire strain relief as well as a means of securing the pairs before being terminated. The pointed projections along the front and back edge of the connector act as pair splitters for the insertion of the cable pairs into the wire strain relief slots. The splitters also identify the center of each pair (Tip to the left, Ring to the right). The slots at each end of the connector (top and bottom) are provided for cable ties for securing the cable pairs to the connector.
- 2.18 **Cable Tie.** The cable tie is a plastic self-clinching tie measuring 89 by 2.4 by 0.8 mm (3-1/2 by 3/32 by 1/32 inches). The cable tie is not provided as part of the connector.
- 2.19 **QSBIX20A Designation Strip (Fig. 2-7)** is a plastic strip which is held in place by the plastic snaps on the fanning strips. The top and bottom ridges on the designation strip are provided for the proper alignment of the designation label. The designation strip is made of fire-retardant plastic, and measures 168 by 19 by 5 mm (6-5/8 by 3/4 by 3/16 inches).

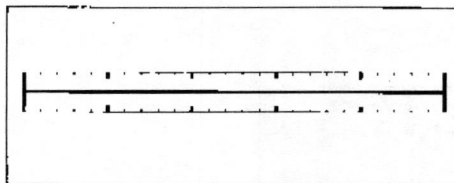
Fig. 2-7
QSBIX20A Designation Strip



631-069

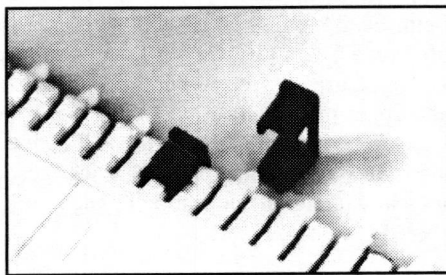
- 2.20 **Designation Labels** (Fig. 2-8). BIX designation labels are color-coded and are available for standard and special wiring arrangements. The designation label has an adhesive backing for attachment to the designation strip. Designation labels can be marked with pen or pencil.

Fig. 2-8
Typical BIX Designation Label



- 2.21 **QGBIX23A Special Service Guard** (Fig. 2-9) is of red plastic and covers one pair position. The guard protects special circuits by preventing wires or tools from entering the pair slots of the connector.

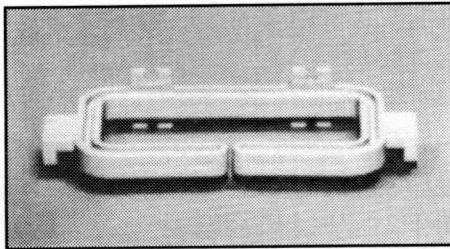
Fig. 2-9
QGBIX23A Special Service Guard



631-070

- 2.22 **QRBIX19A Distribution Ring (Fig. 2-10)** attaches to the retainers at the top and bottom of the fanning strip. The distribution ring is used for the vertical and horizontal jumper channels, and can also be used for cable distribution. Distribution rings are used during installation to ensure the correct alignment and spacing of the mounts. The distribution ring is made of fire-retardant plastic and measures 171 by 76 by 13 mm (6-3/4 by 3 by 1/2 inches). The distribution ring has screw-slots for additional support when the ring is not supported at each end by a mount, or where double distribution rings are required for the horizontal jumper channel.

Fig. 2-10
QRBIX19A Distribution Ring

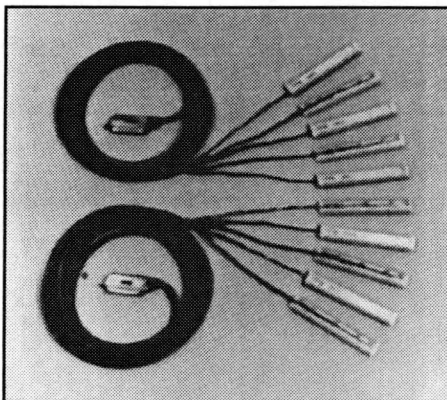


631-071

: CONNECTORIZED KEY SYSTEM ASSEMBLIES

- 2.23 **Connectorized Harness (Fig. 2-11).** The QHBIX12A and B connectorized harnesses are used for terminating key system apparatus leads in the red field. Each harness consists of five QCBIX7A connectors prewired on a 6.1 m (20 ft) stub cable to a 25-pair miniature ribbon connector. Both harnesses are required to fill one mount: the QHBIX12A for the upper position (with connectors numbered 1 through 5) and the QHBIX12B for the lower position (with connectors numbered 6 through 10) Each connectorized harness accommodates one 25-pair cable from a key telephone equipment panel.

Fig. 2-11
: QHBIX12A or B Connectorized Assembly Harness

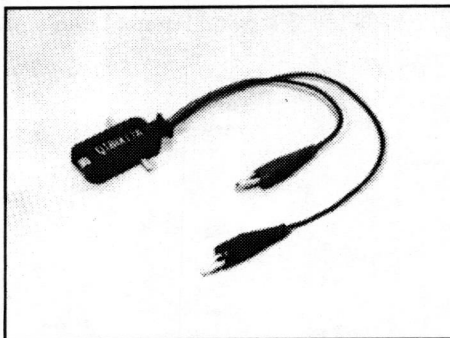


631-072

MISCELLANEOUS HARDWARE

- 2.24** ***QTBIX17A Test Probe (Fig. 2-12)*** attaches to any BIX connector to access a single pair. The two spring-pressure contacts on the test probe engage the clips of the connector to provide electrical continuity. When the test probe is in use and the red side is to the right, the red lead is connected to the Ring, and the black lead is connected to the Tip of the pair. The metal lugs on the top and bottom of the probe are for direct testing of individual conductors. The alligator clips are for connection to various types of test set. The test probe is made of moulded fire-retardant plastic and measures 45 by 19 by 6 mm (1-3/4 by 3/4 by 1/4 inches).

Fig. 2-12
QTBIX17A Test Probe

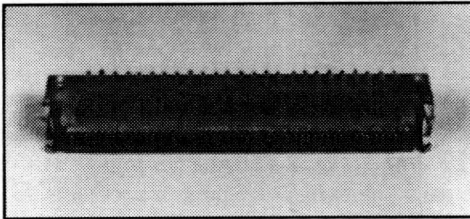


631-073

- 2.25 ***QTBIX22A Test Connector (Fig. 2-13)*** attaches to any BIX connector to access all 25-pair. The fifty spring-pressure contacts on the test connector engage the clips of the BIX connector. The test connector is held in place in the mount by spring clips which attach to the fanning strips of the mount.
- 2.26 With the test connector in place, the top row of exposed contacts are for direct testing of the Tip appearances, and the bottom row are for the Ring appearances. The exposed contacts are marked in 5-pair groups for ease of pair identification. The test connector is made of fire-retardant plastic, and measures 188 by 21.6 by 45.7mm (7.4 by 0.85 by 1.8 inches).

Fig. 2-13

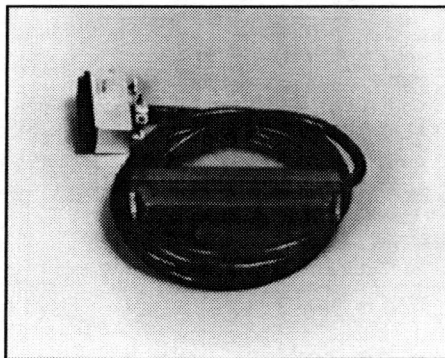
QTBIX22A Test Connector



631-074

- 2.27 ***QTBIX21A Test Shoe (Fig. 2-14)*** is similar to the QTBIX22A test connector except that the rear test contacts have a protective cover and are prewired to a 3 meter (10 foot) cable with a 25-pair Cinch-Jones connector. The test shoe is intended for use in conjunction with automatic pair identification test sets.
- 2.28 The test shoe secures to the BIX connector by spring clips which attach to the fanning strips of the mount. The test shoe is made of fire-retardant plastic and measures 188 by 25.4 by 60.9 mm (7.4 by 1.0 by 2.4 inches).

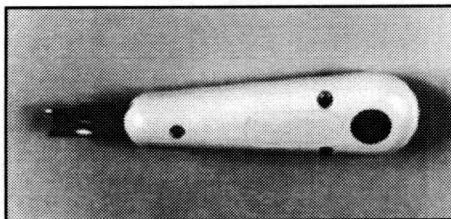
Fig. 2-14
QTBIX21A Test Shoe



631-075

- 2.29 ***QTBIX16A Connection Toll (Fig. 2-15)*** is designed for use with Bix connectors only. The tool has two functions:
- to insert the wire into connector, and cut off the excess wire, or
 - to insert the wire into the connector without cutting the wire.
- 2.30 A button in the handle of the tool selects either the CUT or the NO CUT position (insert only). The metal blade projecting from the handle is equipped with a scissor-action. (the black blade indicates the cutting side of the tool). The connection tool measures 152 by 38 by 25 mm (6 by 1-1/2 by 1 inches).

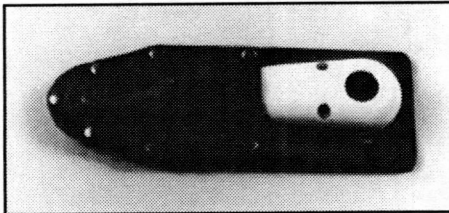
Fig. 2-15
QTBIX16A Connection Tool



631-076

- 2.31 **Leather Pouch (Fig. 2-16).** The leather pouch provides protection for the QTBI16A connection tool. The pouch attaches to the craftsman's belt.

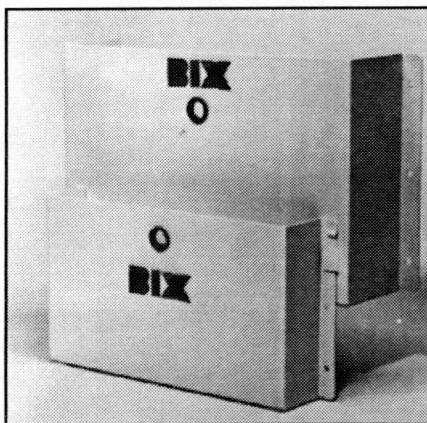
Fig. 2-16
Leather Pouch



631-077

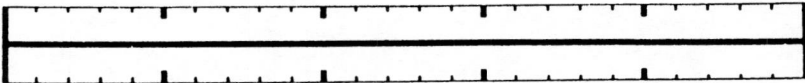
- : 2.32 **QDY1A and QDY2A Wire Dispensers (Fig. 2-17).** Two types of wire dispenser are used with the BIX system. The larger dispenser, QDY1A, stores 3-pair cross-connecting wire, and the smaller dispenser, QDY2A, stores single pair cross connecting wire. Work sheets may be stored in the dispensers also. The two dispensers are usually fitted together and wall-mounted as one assembly, but either can be used independently. The dispensers are usually mounted at a convenient height and location using the appropriate fasteners. The QDY1A dispenser measures 343 by 203 by 76 mm (13-1/2 by 8 by 3 inches), and the QDY2A measures 286 by 152 by 51 mm (11-1/2 by 6 by 2 inches).

Fig. 2-17
: QDY1A and QDY2A Wire Dispensers



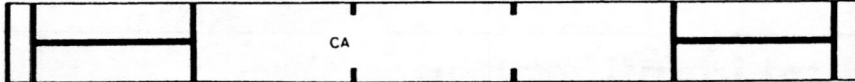
631-078

Product Identification

ITEM	DESCRIPTION	PART NUMBER
1	Designation Labels, Standard	
(a)	Blanks:	
		
: •	Green	P0588400
•	Yellow	P0588401
•	Red	P0588402
•	Blue	P0588403
•	Silver	P0588404
: •	Purple	P0588405
•	White	P0588406

ITEM	DESCRIPTION	PART NUMBER
------	-------------	-------------

(b) Cable Blanks



- Red P0588418
- Green P0588415
- Blue P0588416

ITEM	DESCRIPTION	PART NUMBER
------	-------------	-------------

2 Designation Labels, Special

(a) Key Systems

TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0

• RED FIELD APPARATUS P0588411

TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0

• RED FIELD MULTIPLING P0588419

(b) SL-1 Systems

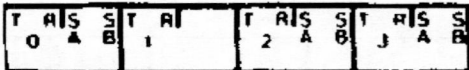
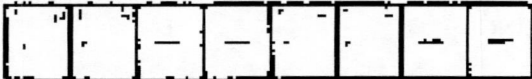
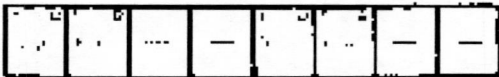
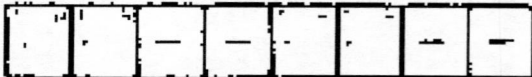
TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0

• BLUE P0588413

TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
TR	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0

• BLUE P0588414

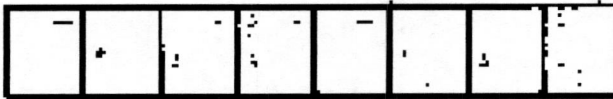
Note: Blue labels are used for preliminary identification of all peripheral shelves and 500-type sets. Designation labels for trunks and SL-1 sets are attached on top of the blue labels. A transparent window is provided to maintain the card number identification.

ITEM	DESCRIPTION	PART NUMBER
2 (b) Cont.d	Trunk Designations	
	SL-1 Sets	
		
• WHITE		P0587229
	CO/FX/WATS TRUNK	
		
• GREEN		P0587230
	LOOP SIGNAL TRUNK	
		
• RED		P0587231
	E & M DX SIGNAL AND PAGING TRUNK	
		
• YELLOW		P0587233

ITEM	DESCRIPTION	PART NUMBER
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2 (b)
Cont.d

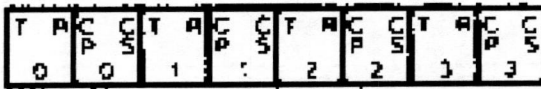
REC. TEL DKT TRUNK APLQ



• ORANGE

P0587232

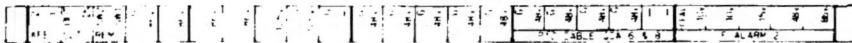
REC. ANN. TRUNK



• PURPLE

P0587234

Miscellaneous
P10 CABLE FROM QCA6
AND QCA8 CABINETS



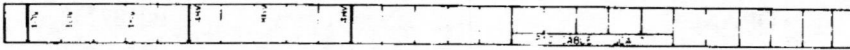
• YELLOW

P0588425

ITEM	DESCRIPTION	PART NUMBER
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2 (b)
Cont.d

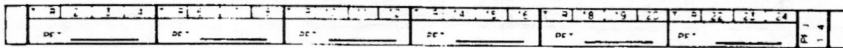
P10 CABLES FROM QCA7
CABINETS



• YELLOW

P0588426

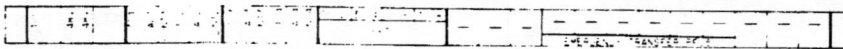
EMERGENCY TRANSFER CABLES
PFJ1-PFJ4



• YELLOW

P0588427

EMERGENCY TRANSFER CABLES PFJ5



• YELLOW

P0588428

ITEM	DESCRIPTION	PART NUMBER
3	Designation Labels, Private Branch Exchange (PBX)	
(a)	SG-1 (Pulse 80)	
	• WHITE	P0588495
(b)	SG-1A (Pulse 120)	
	• WHITE	P0588496
(c)	SE-2	
	CABINET No. 1	
	• WHITE	P0588497
	CABINET No. 2	
	• WHITE	P0588498
	CABINET No. 3	
	• WHITE	P0588499

Note: each PO number consists of a complete set of PBX designation labels.

ITEM	DESCRIPTION	PRODUCT CODE
4	Connector, Distribution	QCBIX1A
5	Connector, Bridging	QCBIX2A
6	Connector, Multipling	QCBIX5A
7	Connector, Key Apparatus	QCBIX7A
8	Connector, Diode	QCBIX9A
9	Cover	QCABIX28A
10	Mount Assembly	QCABIX32A
11	Mount*	QMBIX10A
12	: Mount Assembly*	QMBIX10B
13	Mount Assembly	QMBIX10C
14	Mount	QMBIX31A
15	Mount	QMBIX31B
16	: Harness, Connectorized Assy (Upper)	QHBIX12A
17	: Harness, Connectorized Assy (Lower)	QHBIX12B
18	Connection Tool	QTBIX16A
19	Test Probe	QTBIX17A
20	Test Shoe, 25 pair	QTBIX21A
21	Test Connector, 25 pair	QTBIX22A
22	: Wire Dispenser, Large*	QDY1A
23	: Wire Dispenser, Small*	QDY2A
24	Distribution Ring*	QRBIX19A
25	Designation Strip	QSBIX20A
26	Guard, Special Service	QGBIX23A
27	Tool Pouch	C0054642
28	: Cable Ties	C0039222

* Mounting screws are not supplied with these items.

BIX*

In-Building Cross-Connect System Material Description

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Standard

86 01 17

Printed in the United States of America



**northern
telecom**

BIX*

In-Building Cross-Connect System Material Installation and Servicing (Wall-Mounted System)

Publication number: 631-4511-200

Document Status: Standard

Date: 80 03 14

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•: Not Bell Canada

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General

1. GENERAL

1.01 This section gives installation and servicing procedures for a wall-mounted BIX in-building cross-connect system.

1.02 *References.*

631-4511-100 BIX In-Building Cross-Connect System, Material Description

•631-4511-150 BIX In-Building Cross-Connect System, Planning and Applications.

Use of QTBI16A Connection Tool

- 2.01 The QTBI16A connection tool (Fig. 1) is used to terminate wires in the QCB1X-type connectors. Care should be taken at all times to avoid damage to the tool. The tool should be kept in the protective leather pouch when not in use. A damaged tool must be replaced.
- 2.02 The two-position select button in the handle of the tool selects either the CUT or NO-CUT position. In the CUT position the tool inserts the wire into the connector and cuts off the excess wire. In the NO-CUT position the tool inserts the wire into the connector only. The NO-CUT position is used when looping wire to another location.
- 2.03 The cutting side of the tool is identified by the black blade. In the CUT position, the tool is used with the black blade towards the wire-ends being cut-off.

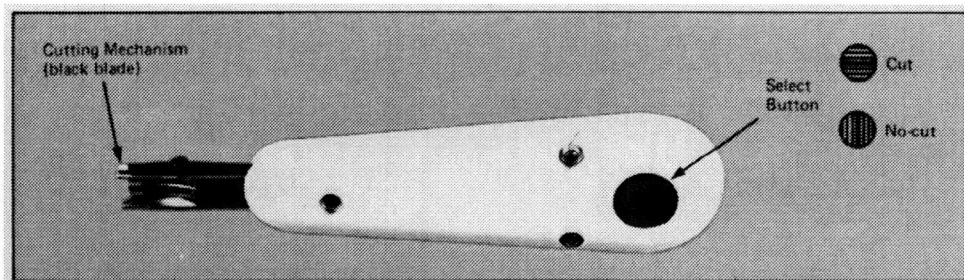


Fig 1 – QTBI16A Connection Tool

- 2.04 *Connection Tool in CUT Position (Fig. 2).*
- (a) Set the select button to CUT.
 - (b) Hold the tool with the black blade towards the wires to be cut-off.

NOTE: In Fig. 2 the wires to be cut-off are shown pointing up.

- (c) Insert the tool into the connector. Hold the tool at right angles to, and level with, the connector.
- (d) Push the connection tool *fully* forward to seat the wire in the connector.

Caution: Wires will not be properly inserted in the connector unless the tool is pushed fully forward and bottomed. The click made by the tool does not necessarily indicate that the wire has been properly inserted.

- (e) Release forward pressure. Note that the cutting action takes place.

2.05 **Connection Tool in the NO-CUT Position (Fig. 3).**

- (a) Set the select button to NO-CUT.
- (b) Insert the tool in the connector. Hold the tool at right angles to, and level with, the connector
- (c) Push the connection tool fully forward to seat the wire in the connector.

Caution: Wires will not be properly inserted in the connector unless the tool is pushed fully forward and bottomed out. The tool does not click in the NO-CUT position.

- (d) Release forward pressure and remove the connection tool from the connector.

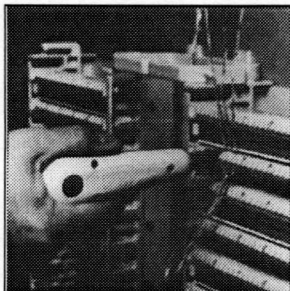


Fig. 2 – Using the Connection Tool in the CUT Position.

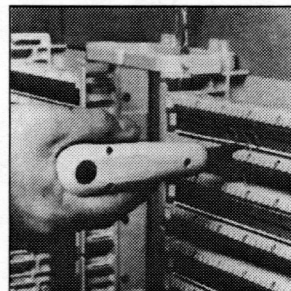


Fig. 3 – Using the Connection Tool in the NO-CUT Position

Installation of QMBIX10A Mounts

- 3.01 Refer to the engineering work plan, or to the completed : BIX System Space Planning and Material Guide Form, and determine:
- the configuration of the planned BIX installation
 - the total quantity of mounts, distribution rings and other hardware required.

CHART I INITIAL MARKING OF WALL SPACE

TOOLS: Measuring tape, pencil.

MATERIALS: None.

REFERENCES: Engineering work plan, or • BIX System Space Planning and Material Guide Form.

STEP PROCEDURE

1. Mark the vertical and horizontal lines on the wall as specified in the work plan. If no work plan or wall measurements are specified, proceed to Step 2 and 3.
2. *Vertical Line.* Mark a vertical line approximately 200 mm (8 inches) from the left-hand side wall, or from other equipment (Fig. 4).

Note: 200 mm (8 inches) is approximately the width of a BIX mount.

3. *Horizontal Line.* Make a horizontal line on the wall 1100 mm (43 inches) from the floor level (Fig. 4).
-

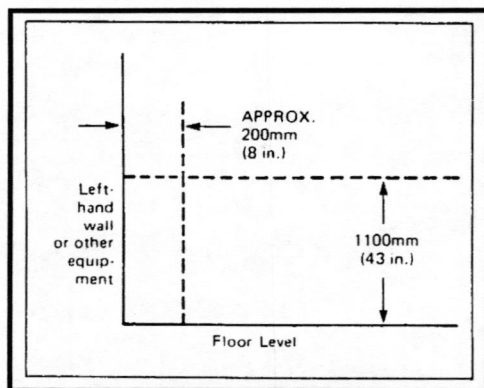


Fig 4. – Initial Marking of Wall Space

CHART 2
INSTALLATION OF QMBIX10A MOUNTS

TOOLS: Screwdriver

MATERIALS: QMBIX10A mounts.

HARDWARE:

- 3/4 inch (or 1/2 inch) #8 round-head wood screws (2 per mount) for plywood mounting.
- appropriate hardware (2 per mount) for other surfaces.

REFERENCES: Engineering work plan, or •BIX System Space Planning and Material Guide.

Note 1: Follow the detailed step-by-step procedure given in Fig. 5.

Note 2: BIX mounts need not be grounded.

STEP PROCEDURE

1. First Mount.

Caution: The correct alignment of the completed BIX installation depends on the accuracy of the vertical and horizontal placing of the first mount.

Align the top of the mount at the intersection of the vertical and horizontal wall markings. Secure the mount with two screws.

2. *Second Mount.* Attach two distribution rings on left side of second mount. Engage both rings in the first mount.

3. Check the horizontal alignment, and secure the mount with two screws.

4. Remove the upper distribution ring.

5. *Third Mount.* Attach distribution rings to the bottom of the third mount. Engage both rings in the first mount.

6. Check the vertical alignment, and secure the mount with two screws. Remove both distribution rings.

7. *Fourth Mount.* Attach two distribution rings on the left side, and one distribution ring at the lower right. Engage all rings in the previously installed mounts.

8. Check the horizontal and vertical alignment, and secure the mount with two screws.

Chart Continued

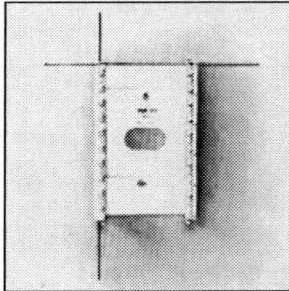
CHART 2 Continued
INSTALLATION OF QMBIX10A MOUNTS

STEP	PROCEDURE
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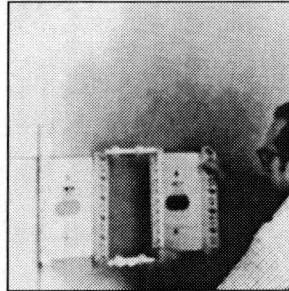
- | | |
|-----|---|
| 9. | <i>Fifth Mount.</i> Butt the fifth mount directly against the second mount. Check the horizontal alignment, and secure the mount with two screws. |
| 10. | <i>Sixth Mount.</i> Butt the sixth mount directly against the fourth mount. Use a distribution ring to ensure correct vertical alignment. Secure the mount with two screws. |
| 11. | <i>Seventh Mount.</i> Butt the bottom of the mount against the top of the third mount. Check the vertical alignment, and secure with two screws. |
| 12. | <i>Subsequent Mounts:</i> Install the remaining mounts required for the initial installation in the manner previously described. Check that the distribution rings for the horizontal and vertical channel are installed as specified on the work plan. |

Note 1: Where distribution rings are required for cable distribution, attach one end of the distribution ring to the mount and secure the ring to the wall with two screws.

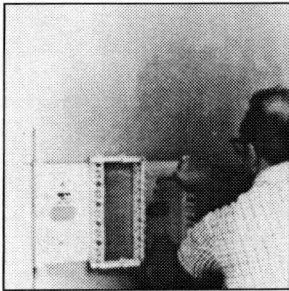
Note 2: For plywood mounting, use #8 3/4 inch (or 1/2 inch) long round-head wood screws. For other surfaces, use the appropriate hardware.



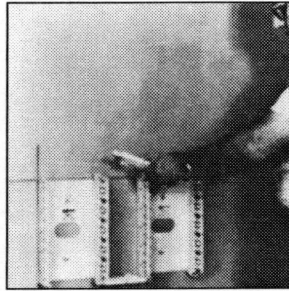
Step 1 – Align first mount and secure



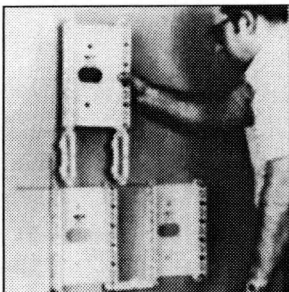
Step 2 – Engage both rings in first mount



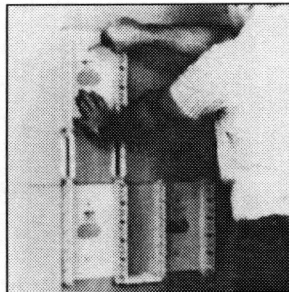
Step 3 – Secure 2nd mount



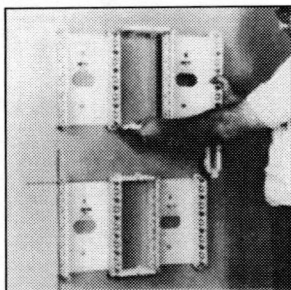
Step 4 – Remove upper ring



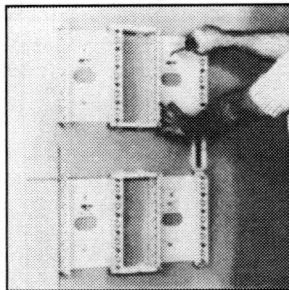
Step 5 – Engage both rings in 1st mount



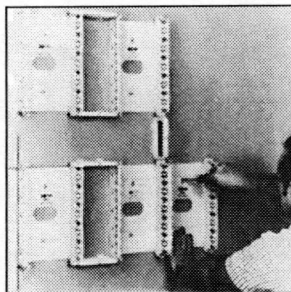
Step 6 – Secure 3rd mount



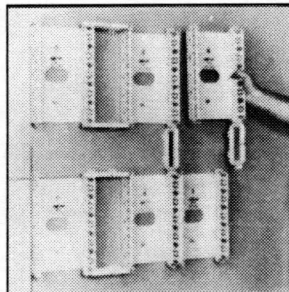
Step 7 – Engage rings in 2nd
& 3rd mount



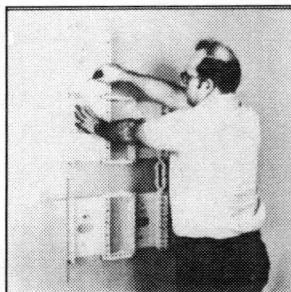
Step 8 – Secure 4th mount



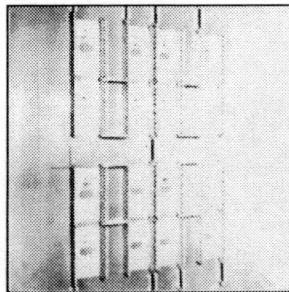
Step 9 – Install 5th mount



Step 10 – Install 6th mount



Step 11 – Install 7th mount



Step 12 – Complete the installation
(typical example shown)

631-082

Fig. 5 – Installation of QMBIX10A Mounts

CHART 3
INSTALLATION OF QMBIX10A MOUNTS IN H303 CABLE TERMINAL SECTIONS

TOOLS: Screwdriver

MATERIALS: QMBIX10A mounts. 1/2 inch #8 round-head wood screws (2 per mount)

REFERENCES: Engineering work plan, or •BIX System Space Planning and Material Guide.

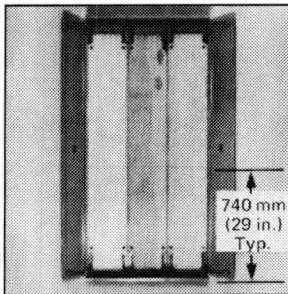
Note 1: Follow the detailed step-by-step procedure given in Fig. 6.

Note 2: BIX mounts are not grounded.

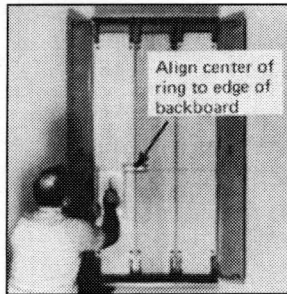
STEP PROCEDURE

1. Mark a horizontal line on the backboard – typically this line is 740 mm (29 inches) from the bottom of the H303.
2. *First Mount.*
 - (a) Attach a distribution ring to the top right-hand side of a mount.
 - (b) Align the top of the mount to the horizontal line and the center of the ring at the space between the first and second backboards.
 - (c) Secure the mount with two screws.
 - (d) Remove the distribution ring.
3. *Second Mount.*
 - (a) Attach two distribution rings at left-hand side second mount.
 - (b) Engage both rings in first mount.
 - (c) Check horizontal alignment.
 - (d) Secure mount with two screws.
4. *Third Mount.*
 - (a) Attach a distribution ring at top right-hand side of third mount.
 - (b) Align the top of the mount to the horizontal line and the center of the ring at the edge of the third backboard
 - (c) Secure the mount with two screws.
 - (d) Remove the distribution ring.

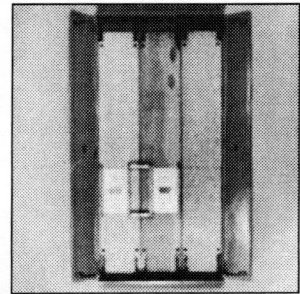
5. *Subsequent Mounts.* Install all the remaining mounts for the initial installation in the manner previously described. Check that distribution rings are installed as specified on the work plan.



Step 1 – Mark the backboard



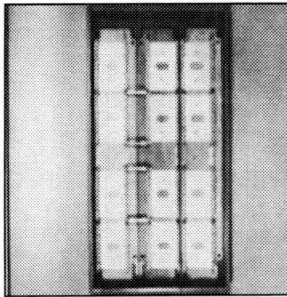
Step 2 – Install 1st mount



Step 3 – Install 2nd mount



Step 4 – Install 3rd mount

Step 5 – Complete the installation
(typical example shown)

631-083

Fig. 6 – Installation of QMBIX10A Mounts in H303 Cable Terminal Sections

Cable Preparation

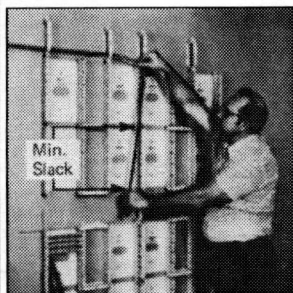
4.01 *General.* It is important to remember to allow sufficient slack wire when preparing cables for termination in BIX connectors:

- *Upper Field.* Allow a minimum of 350 mm (14 inches) below the bottom of the mount on which cable is terminated (Fig. 7).
- *Lower Field.* Allow a minimum of 350 mm (14 inches) above the top of the mount (Fig. 8).

Note: Fig. 7 and 8 show the minimum slack required when preparing cable for the upper mount of each field.

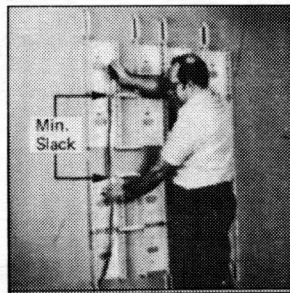
4.02 Before proceeding with cable preparation, refer to Table A to locate the step corresponding to the type of cable being prepared and its location.

4.03 *Grounding and Bonding.* Refer to Div. 638 for the general procedures on grounding and bonding at installation.



631-084

Fig. 7 – Cable Preparation, Upper Field



631-085

Fig. 8 – Cable Preparation, Lower Field

TABLE A
CABLE PREPARATION

CABLE TYPE	LOCATION	CHART 4. STEP	FIGURE
PIC	Upper Field	1	9
	Lower Field	1	12
E Inside Wiring	Lower Field	2	13
D Inside Wiring	Upper Field	3	10
	Lower Field	3	14
Z Station Wire (2-pair)	Upper Field	4	11
	Lower Field	4	15

CHART 4
CABLE PREPARATION

TOOLS: Skinning knife, or sheath removal tool, side-cutting pliers.

MATERIALS: Cable ties (size as required).

REFERENCES: Engineering work plan, or • BIX System Planning and Material Guide.

STEP PROCEDURE

PIC CABLE AND/OR PROTECTOR CABLE

1. *Upper Field (Fig. 9) and Lower Field (Fig. 12).*
 - (a) Remove the cable sheath approximately 150 mm (6 inches) back from the distribution ring.
 - (b) Where required, install a QCM-type bond clamp or equivalent.
 - (c) Tape the cable as far as the distribution ring, if desired.
 - (d) Place the binder groups through the appropriate distribution rings.
 - (e) Ground the cable according to standard practices.

Chart Continued

CHART 4 Continued
CABLE PREPARATION

STEP PROCEDURE

- (f) Tag each 25-pair binder group.
- (g) *Upper Field only.* Place all binder groups in the appropriate mount for termination.
- (h) *Lower Field only.* Place each binder group in the appropriate mount, one at a time, for terminating.

E. INSIDE WIRING CABLE

2 Lower Field (Fig. 13)

- (a) Group the cables into bundles not exceeding 25-pairs.
- (b) Secure each cable bundle with a cable tie.
- (c) Place the cable bundles through the appropriate distribution rings.

D. INSIDE WIRING CABLE

3 Upper Field (Fig. 10) and Lower Field (Fig. 14).

- (a) Place the cables through the appropriate distribution rings.
Note: Do not secure with a cable tie, as this causes cable-bunching at the entrance of the mount.
- (b) *Upper Field Only.* Place the cables in the appropriate mount.
- (c) Remove the sheath at the level of the conductor being worked on for termination later.

Z. STATION WIRE

4 Upper Field (Fig. 11) and Lower Field (Fig. 15).

- (a) Place the wires through the appropriate distribution rings.
- (b) Group the wires in bundles to a maximum of 24 pairs. (24 pairs is the maximum connector capacity for 2-pair Z station wire.)
- (c) Use a cable tie to hold wire bundle together.
- (d) *Upper Field only.* Place all wire bundles in the mount.
- (e) *Lower Field only.* Place wire bundles in mount, one at a time, as required for terminating.
- (f) Cut the sheath to the level of the connector being worked on.
- (g) Slide the sheath forward to maintain the wire identification for termination.

UPPER FIELD

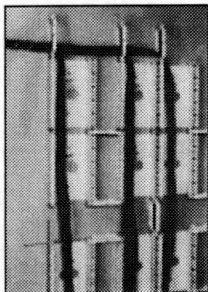


Fig. 9 - PIC Cable

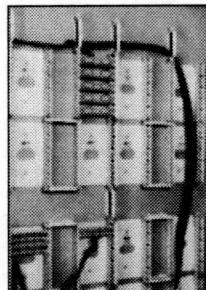
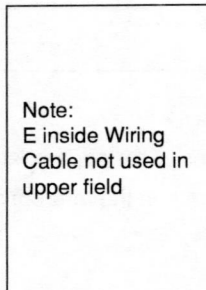


Fig. 10 - D Inside Wiring Cable

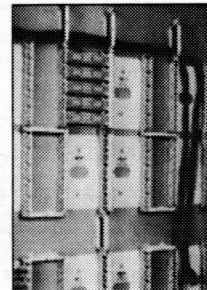


Fig. 11 - Z Station Wire

LOWER FIELD

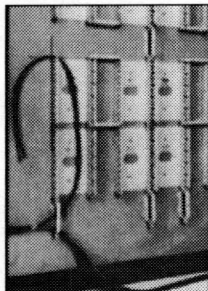


Fig. 12 - PIC Cable

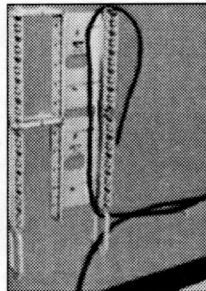


Fig. 13 - E Inside Wiring Cable

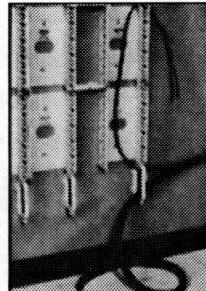


Fig. 14 - D Inside Wiring Cable



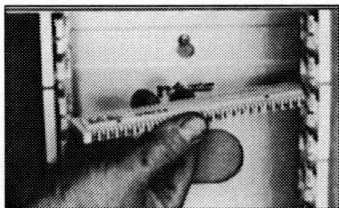
Fig. 15 - Z Station Wire

Cable Termination

- 5.01 The procedure for terminating cables on BIX connectors is described in two charts:
- Chart 5 – general procedure using QCBIX1A connectors.
 - Chart 6 – procedure (red field) using QCBIX5A and 7A connectors.

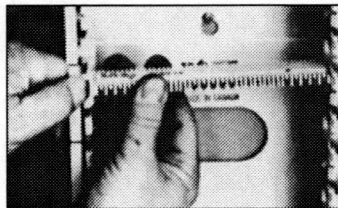
Insertion and Removal of BIX Connectors

- 5.02 *QCBIX1A, 2A, 5A and 7A connectors* are inserted in a mount by placing one end of the connector in the appropriate latch of the fanning strip (Fig. 16), and pushing the other end of the connector into the mount. BIX connectors are removed from the mount by releasing the latch at one end and pulling forward (Fig. 17).
- 5.03 *QCBIX9A Connectors.* The QCBIX9A diode connector occupies two positions in a mount. To insert the 9A connector, place one end in the appropriate two latches of the fanning strip (Fig. 18), and push the other end of the connector into the mount. Remove the 9A connector by releasing both latches on one side of the mount (Fig. 19).



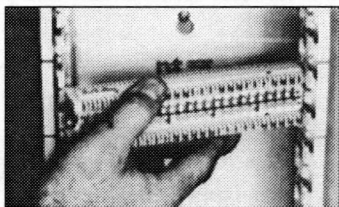
631-093

Fig. 16 – Insertion of Connector



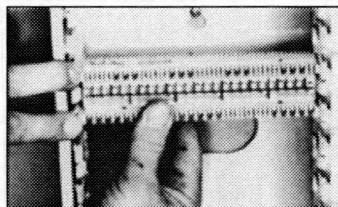
631-094

Fig. 17 – Removal of Connector



631-095

Fig. 18 – Insertion of 9A Connector



631-096

Fig. 19 – Removal of 9A Connector

Termination Procedure (QCBIXIA Connectors)

- 5.04 For terminating purposes only, the BIX connectors in the mount are considered in groups. The jumper wire slots in the fanning strip provide a convenient way of dividing the connectors into five groups (Fig. 20). Each connector group consists of an upper connector and a lower connector.
- 5.05 Before starting the termination procedure, note the following points:
- The upper connector of each connector group is normally terminated first,
 - Connectors are normally terminated starting from the top and working down towards the bottom of the mount.

Termination Procedure Red Field (QCBIX5A, 7A Connectors)

- 5.06 For terminating purposes *in the red field*, the ten BIX connectors are considered as two groups of five connectors each (Fig. 21). Each connector group terminates one 25-pair cable or binder group. Before proceeding with red field termination, note the following points:
- the five connectors in the upper half of the mount are normally terminated first;
 - connectors are normally terminated starting from the top and working down towards the bottom of the mount.

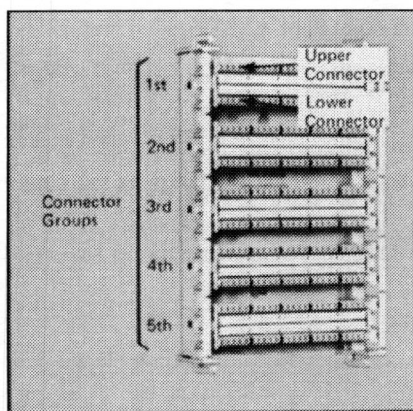


Fig. 20 – Connector Groups, Termination Procedure (QCBIX1A Connectors)

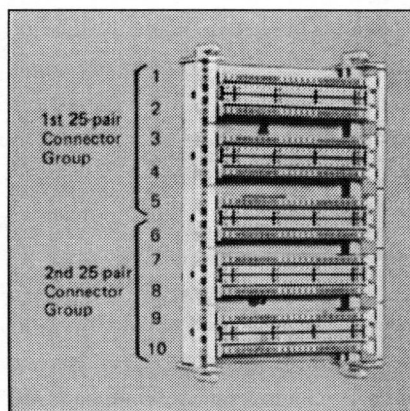


Fig. 21 – Connector Groups, Red Field Termination Procedure, (QCBIX5A, 7A Connectors)

CHART 5
CABLE TERMINATION PROCEDURE (QCBIXIA CONNECTORS)

TOOLS: QTBIX16A connection tool (2.01 through 2.05), side-cutting pliers, cable stripper or sheath removal tool.

MATERIALS: QCBIXIA connectors, cable ties.

REFERENCES: Engineering work plan, or •BIX System Space Planning and Material Guide Form.

Note 1: Follow the detailed step-by-step procedure given in Fig. 22.

Note 2: Cable is terminated on the connector so that it hinges on the jumper channel side.

Note 3: Check that the connectors are the correct QCBIX-type.

STEP PROCEDURE

UPPER CONNECTOR

1. Insert a cable tie in the connector.
2. Remove cable sheath to level of the connector being worked on. Place the wire bundle along the top of the connector, and *loosely* fasten the cable tie.
3. Slide the connector along the wire bundle to give approximately 180 mm (7 inches) of slack from the end of the sheath to the cable tie (180 mm is approximately the width of a BIX mount). Tighten the cable tie, and trim off the excess.
4. Insert the connector in the mount.

Note 1: The wire bundle should be on top of the connector.

Note 2: Cable tie should be towards the jumper channel (or distribution ring) side of mount.

Note 3: Cable should be on side of mount away from jumper channel.

5. Select the pairs and insert into the wire slots of the connector. Markings on the edge of the connector identify the 5-pair subbinder groups.

Note 1: Use the pair splitter on the front edge of the connector to separate Tip and Ring (Tip-left, Ring-right).

Note 2: All wire pairs should be pointing down.

6. Terminate the pairs and cut off the ends with the QTBIX16A connection tool (2.04).

Note: Set the connection tool as follows:

- Select button to CUT
- Cutting-side (back blade) pointing down.

Chart Continued

CHART 5 Continued
CABLE TERMINATION PROCEDURE (QCBIX1A CONNECTORS)

STEP PROCEDURE

7. Remove the connector from the mount. Turn the connector over so that the wire bundle is at the bottom. Dress the cable in the mount to the side away from the jumper channel. Firmly press the cable pairs to the back edge of the connector.
8. Insert the connector in mount. (Cable tie end adjacent to the jumper channel first.) Dress the cable in the mount to the side away from the jumper channel.

LOWER CONNECTOR

9. Insert a cable tie in the connector.
10. Remove cable sheath to the level of connector being worked on. Place wire bundle along the bottom of the connector. Loosely fasten the cable tie. Slide the connector along the wire bundle to give approximately 180 mm (7 inches) of slack from end of sheath to the cable tie (180 mm is approximately the width of a BIX mount). Tighten cable tie. Trim off excess.
11. Insert the connector in the mount.
Note 1: The wire bundle should be on the bottom of the connector.
Note 2: Cable tie should be towards the jumper channel (or distribution ring) side of mount.
Note 3: Cable should be on side of mount away from jumper channel.
12. Select pairs and insert into the wire slots of the connector. Markings on the edge of the connector identify the 5-pair subbinder groups.
Note 1: Use the pair splitter on the front edge of the connector to separate Tip and Ring (Tip-left, Ring-right).
Note 2: All wire pairs should be pointing up.
13. Terminate the pairs with the QTBIX16A connection tool (2.04).
Note: Set the connection tool as follows:
 - Select button to CUT
 - Cutting side (black blade) pointing up.
14. Remove the connector from the mount. Turn connector over so that wire bundle is at the top. Firmly press the cable pairs to the back edge of the connector.
15. Insert the connector in the mount. (Cable tie end adjacent to the jumper channel first.) Dress the cable in the mount to the side away from the jumper channel.

CHART 6
TERMINATION PROCEDURE, RED FIELD (QCBIX5A, 7A CONNECTORS)

TOOLS: QTBIX16A connection tool (2.01 through 2.05), side-cutting pliers, cable stripper or sheath removal tool.

MATERIALS: QCBIX5A or 7A connectors, cable ties.

REFERENCES: Engineering work plan, or •BIX System Space Planning and Material Guide.

Note 1: Follow the detailed step-by-step procedure given in Fig. 23.

Note 2: Check that the connectors are the correct QCBIX-type.

Note 3: The following procedure is for either PIC or D inside wiring cable. Fig. 23 shows D inside wiring cable.

STEP PROCEDURE

FIRST CONNECTOR GROUP

1. First Connector. Place subbinder group (white Tip) on top of connector, and loosely fasten with a cable tie.
2. Slide connector along wire bundle to give approximately 180 mm (7 inches) of slack from the end of the sheath to the cable tie (180 mm is approximately the width of a BIX mount). Tighten cable tie, and trim off the excess.
3. Insert connector in mount (cable tie end adjacent to jumper channel).

Note 1: Wire bundle should be on top of connector.

Note 2: Cable tie should be toward the jumper channel (or distribution ring) side of mount.

Note 3: Cable should be on side away from jumper channel.

4. Select pairs and insert into the first pair position of each group as identified by the markings on the edge of the connector:

QCBIX5A: 1, 6, 11, 16, 21

QCBIX7A: 1, 3, 10, 17, 24

Note 1: Use the pair splitter on the front edge of the connector to separate Tip and Ring (Tip-left, Ring-right).

Note 2: All wire pairs should be pointing down.

5. Terminate the pairs and cut off the ends with the QTBIX16A connection tool (2.04). Remove connector from the mount, and turn the connector over so that the wire bundle is at the bottom. Firmly press the cable pairs to the back edge of the connector

Chart Continued

CHART 6 Continued
TERMINATION PROCEDURE, RED FIELD (QCBIX5A, 7A CONNECTORS)

STEP	PROCEDURE
6.	Insert the connector in the mount (cable tie end adjacent to the jumper channel first). Dress the cable in the mount on the side away from the jumper channel.
7.	<i>Second Connector.</i> Place subbinder group (red Tip) on bottom of connector, and loosely fasten with a cable tie. Slide connector along wire bundle to give approximately 130 mm (7 inches) of slack from the end of the sheath to the cable tie (180 mm is approximately the width of a BIX mount). Tighten the cable tie, and trim off the excess.
8.	Insert the connector in the mount. <i>Note 1:</i> The wire bundle should be on the bottom of the connector. <i>Note 2:</i> Cable tie should be towards the jumper channel (or distribution ring) side of the mount. <i>Note 3:</i> Cable should be on the side of the mount away from the jumper channel.
9.	Select pairs and insert into the first pair position of each group as identified by the markings on the edge of the connector: QCBIX5A: 1, 6, 11, 16, 21 QCBIX7A: 1, 3, 10, 17, 24 <i>Note 1:</i> Use the pair splitter on the front edge of the connector to separate Tip and Ring (Tip-left, Ring-right). <i>Note 2:</i> All connector pairs should be pointing up.
10.	Terminate the pairs and cut off the ends with the QTBIX16A connection tool (2.04). Remove the connector from the mount, and turn the connector over so that the wire bundle is at the top. Firmly press the cable pairs to the back edge of the connector. Insert the connector into the mount (cable tie end adjacent to the jumper channel first). Dress the cable in the mount on the side away from the jumper channel.
11.	<i>Third, Fourth, and Fifth Connectors.</i> <ul style="list-style-type: none">• <i>Third Connector:</i> Terminate the subbinder group (black Tip) as given in steps 1 through 6.• <i>Fourth Connector:</i> Terminate the subbinder group (yellow Tip) as given in Steps 7 through 10.• <i>Fifth Connector:</i> Terminate the subbinder group (violet Tip) as given in Steps 1 through 6.

Chart Continued

CHART 6 Continued
TERMINATION PROCEDURE, RED FIELD (QCBIX5A, 7A CONNECTORS)

STEP PROCEDURE

SECOND CONNECTOR GROUP

- 12 *Sixth Connector.* Place subbinder group (white Tip) on the connector, and loosely fasten with a cable tie.
- 13 Repeat the termination procedure given in Steps 7 through 10.
- 14 *Subsequent Connectors.*
- *Seventh Connector:* Terminate the subbinder group (red Tip) as given in Steps 1 through 6.
 - *Eighth Connector:* Terminate the subbinder group (black Tip) as given in Steps 7 through 10.
 - *Ninth Connector:* Terminate the subbinder group (yellow Tip) as given in Steps 1 through 6.
 - *Tenth Connector:* Terminate the subbinder group (violet Tip) as given in Steps 7 through 10.

CHART 7
INSTALLATION OF QHBIX12-TYPE WIRING HARNESSSES

TOOLS: None

MATERIALS: QHBIX12-type wiring harnesses (as required).

REFERENCES: Engineering plan, or •BIX System Space Planning and Material Guide.

Note 1: Ensure that the harnesses are the correct QHBIX-type specified on the plan: QHBIX12A has connectors numbered 1 through 5, QHBIX12B has connectors numbered 6 through 10.

Note 2: Wiring harness connectors are always inserted in the mount with the number facing up.

Note 3: Follow the detailed step-by-step procedure given in Fig. 24.

STEP PROCEDURE

QHBIX12A HARNESS

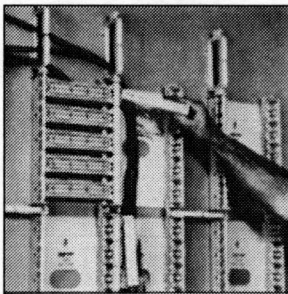
1. Select connector #1 and insert in the mount.
2. Select connector #2 and insert in the mount.

Note: The wire bundle is on the bottom for connector #1 and on the top for connector #2.

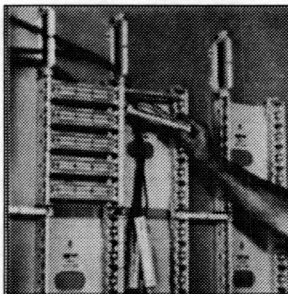
3. Insert connectors #3, #4, and #5 in the correct sequence in the mount.

QHBIX12B HARNESS

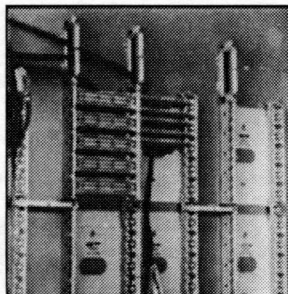
4. Select connector #6 and insert in the mount.
5. Insert connectors #7, #8, #9, and #10 in the correct sequence in the mount.



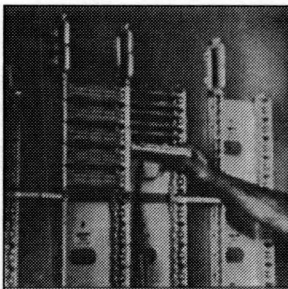
Step 1 – Select connector 1



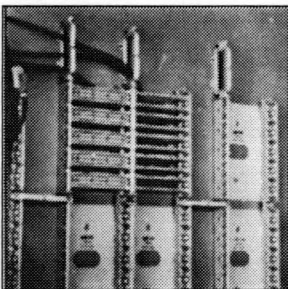
Step 2 – Select connector 2



Step 3 – Install all QHBIX12A connectors



Step 4 – Select connector 6



Step 5 – Install all QHBIX12B connectors

• Fig. 24 – Installation of QHBIX12 – Type Harnesses

Designation

CHART 8 INSTALLATION AND REMOVAL OF DESIGNATION STRIPS

TOOLS: Pen or pencil.

MATERIALS: QSBIX20A designation strips, BIX designation labels.

REFERENCES: Engineering work plan, or •BIX System Space Planning and Material Guide Form.

STEP	PROCEDURE
------	-----------

INSTALLATION

1. Select the designation label of the correct type and color.
2. Attach adhesive label to the designation strip (Fig. 25).

Caution: For correct alignment of the label and the connector, line up the end of the label with the end of the designation strip.

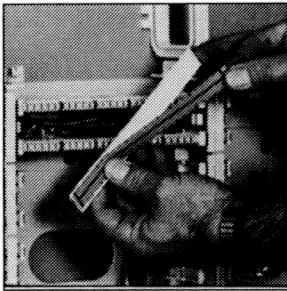
3. Mark any additional information on the designation label with pen or pencil (▲ Pen Marking Z).

Note : Additional designation can be marked on the fanning strip as required.

4. Insert the designation strip in the mount (Fig. 26).

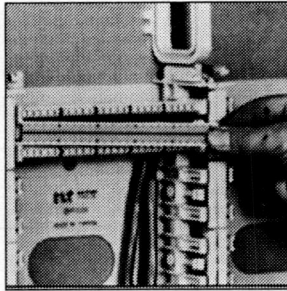
REMOVAL

5. To release the designation strip, press back on the plastic snap of the fanning strip (Fig. 27). The designation strip releases on the opposite side of the mount.



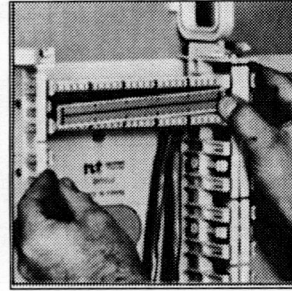
631-102

Fig 25 – Attach label to
Designation Strip



631-103

Fig 26 – Insert Designation Strip
in the Mount



631-104

Fig 27 – Removal of Designation
Strip

▲ Bell Canada application

Cross Connection

- 8.01 *Installing Wires.* Install cross-connecting according to the connection list, (or service order), as described in Chart 9.
- 8.02 *Removing Wires.* Remove wires from a BIX connector by taking one pair at a time and pulling forward, and away from the connector.
- 8.03 When wires are incorrectly removed from the connector, small pieces of insulation may remain in the connector. Carefully remove any small insulation pieces that remain using long-nosed pliers.

CHART 9 CROSS-CONNECTION PROCEDURE

TOOLS: QTBIX16A connection tool.

MATERIALS: Cross-connecting wire.

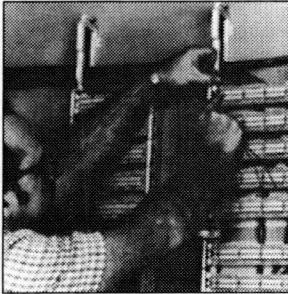
REFERENCES: Cross-connecting list, or service order.

Note: Follow the detailed step-by-step procedure given in Fig. 28.

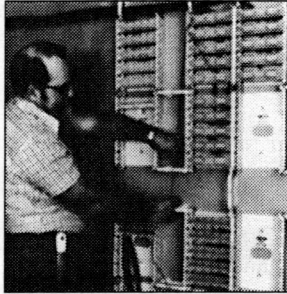
STEP PROCEDURE

1. Insert cross-connecting wire in the connector. Insert pairs one at a time at the specified pair location (Tip-left, Ring-right).
2. Pull wire taut.
Insert wire in slots of fanning strip. Feed wire through slots of distribution rings. Insert wire in slots of fanning strip (second location).

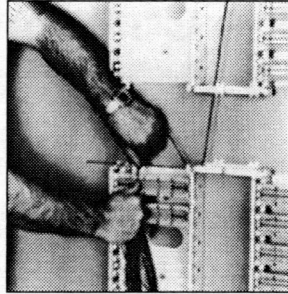
3. Allow approximately 75 mm (3 inches) of slack wire. (The width of the hand is an approximate measurement of the slack necessary.)
4. Terminate the cross-connecting wire (on both connectors) with the connection tool (2.04).
Note: Do not terminate more than one wire in the clip.
5. Dress the slack wire in the jumper channel.



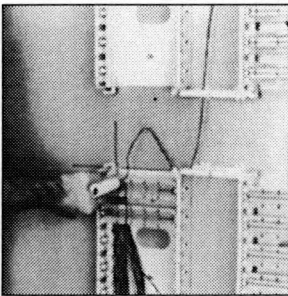
Step 1 – Insert cross-connect wire in connector



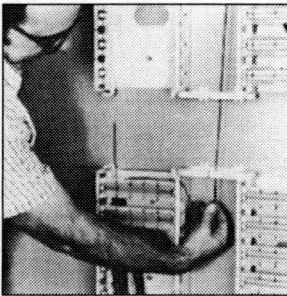
Step 2 – Feed wire in jumper channel



Step 3 – Leave 75mm slack.
Insert wire in connector



Step 4 – Terminate wire on both connectors

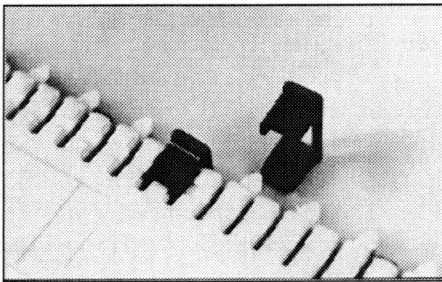


Step 5 – Dress slack wire in jumper channel

Fig. 28 – Cross-Connection Procedure

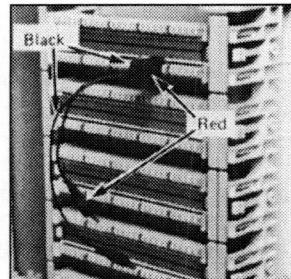
Installation and Removal of QGBIX23A Special Service Guard

- 9.01 *Installation.* Hold the QGBIX23A between thumb and forefinger and insert into the BIX connector, ensuring it is centered over the pair splitter (Fig. 29).
- 9.02 *Removal.* Remove the guard by pulling it away from the connector.



631-070

Fig. 29 – QGBIX23A Special Service Guard



631-106

Fig. 30 – Single Pair Testing

Testing

Single-Pair Testing

- 10.01 Insert the QTBIX17A test probe into the BIX connector with the probe centered over the pair splitter (Fig. 30). For testing of individual conductors, use either the metal lugs at top and bottom of the test probe, or the alligator clips on the ends of the leads to access the conductors.

Note 1: Use additional test probes to test more than one circuit at a time (including testing of adjacent pairs).

Note 2: On the test probe, RED (right) indicates Ring; BLACK indicates Tip.

Pair Testing

- 10.02 *Test Connector.* Insert the QTBIX22A test connector into the BIX connector as shown in (Fig. 31). With the test connector in position (Fig. 32) the top row of exposed contacts access the Tip appearances and the bottom row access the Ring appearances.

Note 1: Ensure that the spring clips at each end of the test connector are fully engaged in the fanning strips.

Note 2: Remove the test connector by releasing the spring clips at each end of the test connector (Fig. 33).

- 10.03 *Test Shoe.* Insert the QTBIX21A test shoe into the BIX connector and connect the 25-pair Cinch-Jones connector to the appropriate test set.

Note: The test shoe is inserted and removed from the BIX connector in the manner previously described for the test connector (Fig. 31, 33).

Servicing

CHART 10 REPLACING A DISTRIBUTION RING

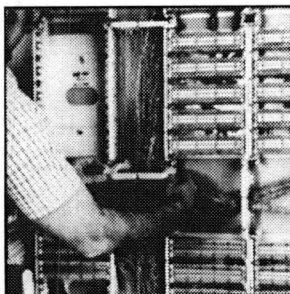
TOOLS: None

MATERIAL: Replacement QRBIX19A Distribution Ring.

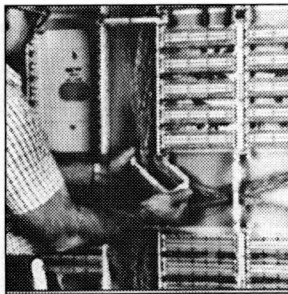
REFERENCES: Fig. 34.

STEP PROCEDURE

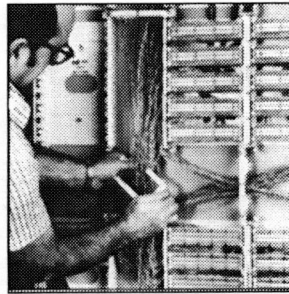
1. Carefully pull the distribution ring forward from mount(s).
2. Rotate the ring.
3. Spread the ring, and carefully remove the jumper wires.
4. Install a replacement ring by repeating Steps 1 through 3 in reverse order.



Step 1 – Pull ring forward



Step 2 – Rotate ring



Step 3 – Remove jumper wires

Fig. 34 – Replacing a Distribution Ring

CHART 11
ACCESSING THE REAR OF A BIX CONNECTOR

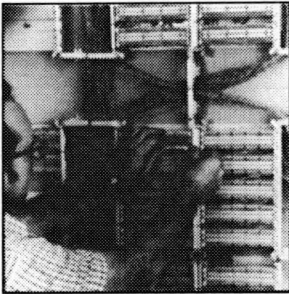
TOOLS: None

MATERIAL: None

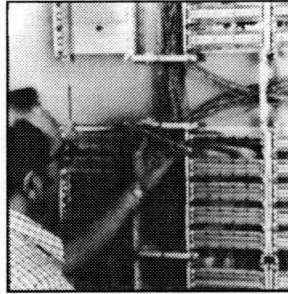
REFERENCES: Fig. 35.

STEP PROCEDURE

1. Remove the designation strip (Chart 8, Step 5). Release the connector from the mount on the side away from the jumper channel.
2. Remove connector access the rear of the connector by rotating outwards.



Step 1 – Remove designation,
strip, release connector



Step 2 – Access rear of connector

Fig. 35 – Accessing the Rear of a BIX Connector

631-111

CHART 12 REPLACING A CABLE

TOOLS: QTBIX16A connection tool, side-cutting pliers.

MATERIAL: Replacement cable.

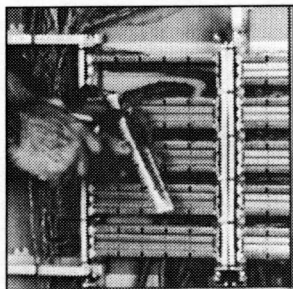
REFERENCES: Fig. 36

STEP PROCEDURE

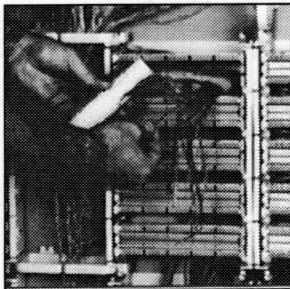
1. Remove the designation strip (Chart 8, Step 5). Carefully remove jumpers from fanning strip. Remove the connector associated with the cable to be replaced, and access the rear of the connector (Chart 11). Cut the cable tie.
2. Remove the cable pairs one at a time.
3. Remove old cable. Feed new cable through the rear of the mount.
Note: Allow sufficient slack for termination later
4. Strip cable sheath to the level required.
5. Insert cable tie in connector (on jumper channel side).
6. Place wire bundle on connector. Loosely fasten cable tie. Slide connector along the wire bundle to give a slack of approximately 180 mm (7 inches). Tighten the cable tie, and trim off the excess.
7. Insert connector in mount, and terminate the cable pairs (Chart 5).

Note: For upper connectors the wire bundle is on top, and for lower connectors the wire bundle is on the bottom.

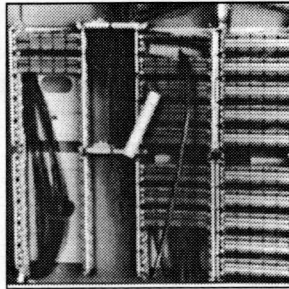
Remove the connector from the mount, rotate, and reinsert into the mount. Replace jumpers in fanning strip. Replace designation strip.



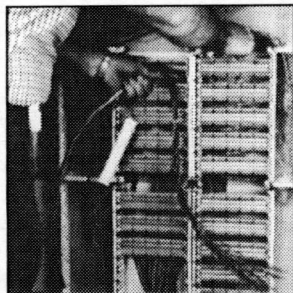
Step 1 – Access rear of connector.
Cut cable tie



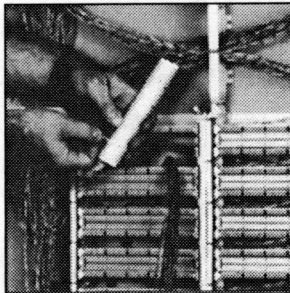
Step 2 – Remove cable pairs



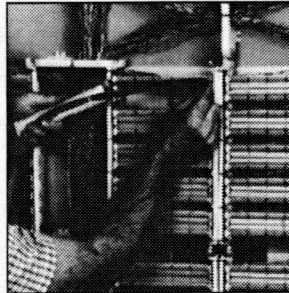
Step 3 – Feed new cable



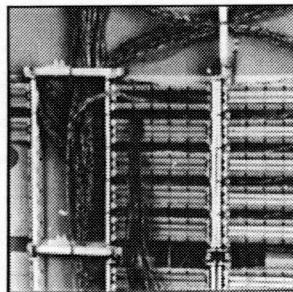
Step 4 – Strip cable sheath



Step 5 – Insert cable tie



Step 6 – Allow 180 mm (7 in.)
slack. Tighten cable tie



Step 7 – Insert connector, proceed
to terminate pairs (Chart 5)

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Fig. 36 –Replacing a Cable

CHART 13 REPLACING A BIX CONNECTOR

TOOLS: QTBIX16A connection tool, side-cutting pliers.

MATERIAL: One QCBIX-type connector.

REFERENCES: Fig. 37

STEP PROCEDURE

INITIAL PREPARATION

1. Remove the designation strip (Chart 8, Step 5.) Remove the damaged connector (Chart 11).

Caution: Take care when feeding the jumper wires out of the fanning strip.

TRANSFER OF CABLE PAIRS

2. Place cable tie on new connector, and *loosely* fasten to wire bundle. Cut the cable tie on the old connector.
3. Remove cable pairs from old connector. Tighten the cable tie on new connector, trim off the excess.

Note: Do not remove jumper wires at this time.

4. Insert cable pairs in new connector in the correct color sequence.
5. Insert new connector in the mount, and terminate the cable pairs. Remove connector, rotate, and reinsert in the mount. (Chart 8).

Note: For upper connector the wire bundle is on top, and for lower connectors the wire bundle is on the bottom.

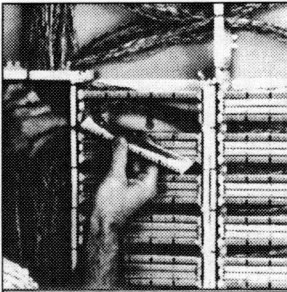
TRANSFER OF JUMPER WIRES

6. Remove the connector *either* above or below as necessary. Install old connector in that position.

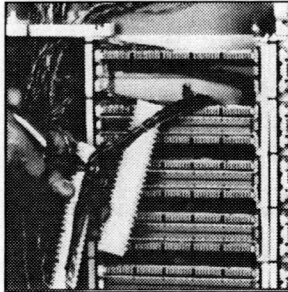
Note 1: For lower connectors, remove the connector above. For upper connectors, remove the connector below.

Note 2: Take care not to damage the connector being temporarily removed.

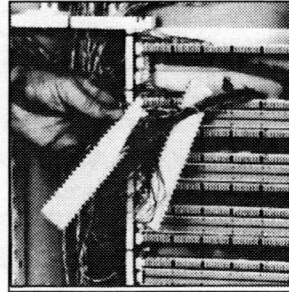
7. Fan the jumper wires from the old connector into the new connector.
 8. Terminate the jumper wires on the new connector.
 9. Remove the old connector from the upper (or lower) position. Insert the connector temporarily removed. Carefully replace jumper wires in the fanning strip of the mount. Replace designation strip.
-



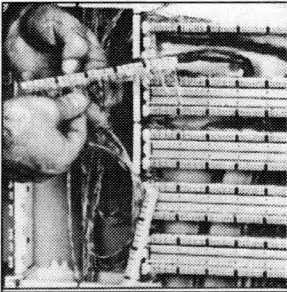
Step 1 – Remove connector from mount



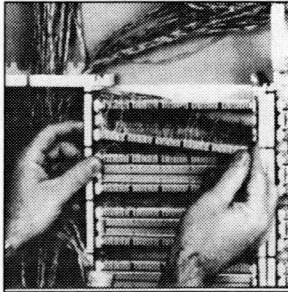
Step 2 – Attach cable tie to new connector and fasten to wire bundle. Cut cable tie on old connector



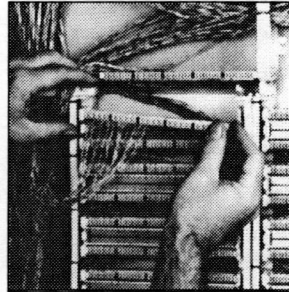
Step 3 – Old connector:
– Remove pairs
New connector:
– Tighten cable tie



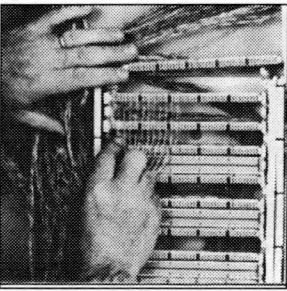
Step 4 – New connector-insert cable pairs



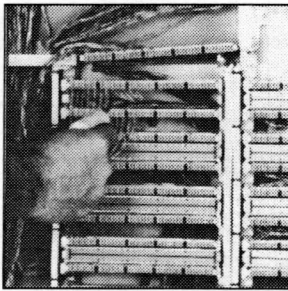
Step 5 – Insert new connector in mount. Terminate cable pairs



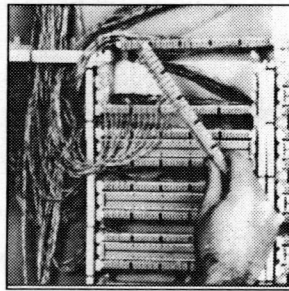
Step 6 – Remove connector either above or below. Install old connector



Step 7 – Fan jumper wires from old connector to new connector



Step 8 – Terminate jumper wires



Step 7 – Remove old connector from upper (or lower) position. Insert connector temporarily removed. Replace jumper wires in fanning strip of mount

631-113

Fig. 37 –Replacing a BIX Connector

CHART 14
REPLACING A QMBIX10A MOUNT

TOOLS: Screwdriver.

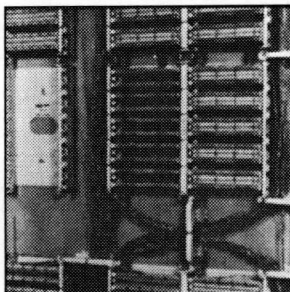
MATERIAL: Replacement QMBIX10A mount.

REFERENCES: Fig. 38.

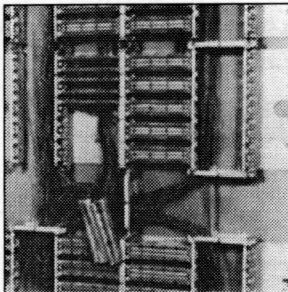
Note: The sequence shows a mount being replaced in a red field. Other mounts are replaced similarly.

STEP PROCEDURE

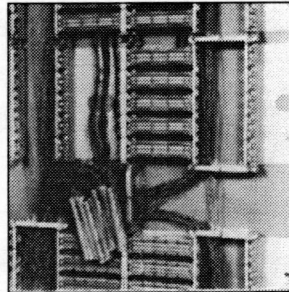
1. Remove all designation strips and distribution rings.
2. *Carefully* remove the lower *five* connectors with the associated jumper wires from the mount.
3. *Carefully* remove the upper *five* connectors and associated jumper wires from the mount.
4. Remove screws securing mount.
5. Remove mount.
6. Install new mount by reversing the procedure given in Steps 1 through 5.



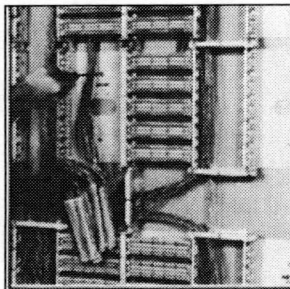
Step 1 – Remove designation strips and rings



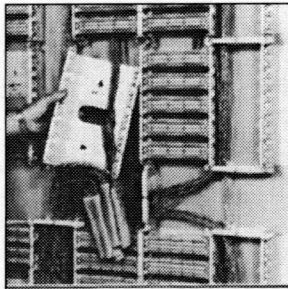
Step 2 – Remove LOWER five connectors



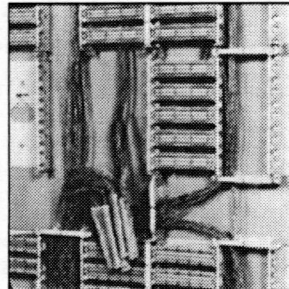
Step 3 – Remove UPPER five connectors



Step 4 – Remove screws from mount



Step 5 – Remove mount



Step 6 – Install new mount

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Fig. 38 –Replacing a QMBIX10A Mount

BIX*

In-Building Cross-Connect System

Material Installation and Servicing

(Wall-Mounted System)

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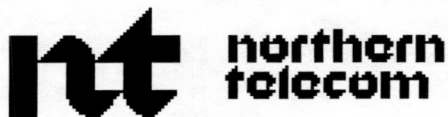
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Publication number: 631-4511-200 Addendum

Document Status: Standard

Date: 81 12 01

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General

- 1.001 This addendum supplements 631-4511-200.
- 1.002 This addendum is issued to add information on electrical protection requirements for the BIX cross-connect systems.
- 1.03 BIX hardware is intended for use in terminating and cross-connecting telephone system conductors. All installations of BIX hardware must meet the electrical protection requirements as prescribed by the applicable codes. Electrical protection, where required, must be installed between the exposed conductors and the BIX cross-connect hardware.

BIX*
In-Building Cross-Connect System
Material Installation and Servicing
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